PROSPECTIVE PAYMENT
ASSESSMENT COMMISSION

TECHNICAL APPENDIXES TO THE REPORT AND RECOMMENDATIONS TO THE SECRETARY, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

MARCH 1, 1988

REPORTS
RA
971
.32
U558a
1988

RA971.32
.U55P
1988

PROSPECTIVE PAYMENT
ASSESSMENT COMMISSION

TECHNICAL APPENDIXES TO THE REPORT AND RECOMMENDATIONS TO THE SECRETARY, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

MARCH 1, 1988

PROSPECTIVE PAYMENT ASSESSMENT COMMISSION

Stuart H. Altman, Ph.D., *Chairman*

Harold A. Cohen, Ph.D.
Carolyne K. Davis, Ph.D.
Curtis C. Erickson
William D. Fullerton
B. Kristine Johnson
Sheldon S. King
Barbara J. McNeil, M.D.
Kathryn M. Mershon
James J. Mongan, M.D.
Eric Muñoz, M.D.
John C. Nelson, M.D.
Leonard D. Schaeffer
Steven A. Schroeder, M.D.
Bert Seidman
Jack K. Shelton
Bruce C. Vladeck, Ph.D.

Staff and Consultants

Donald A. Young, M.D., *Executive Director*
Bruce Steinwald, *Deputy Director*

Meryl F. Bloomrosen
Laura A. Dummit
Doreen Denitz Garcia
Jolene A. Hall
Carrie L. Johnson
Mary Ethel Kabisch
Linda Key
Gerald F. Kominski, Ph.D.
Amy D. Kossoff, M.D.
Eileen V. Lake
Lynn L. Lewis
Craig K. Lisk
Candace L. Littell
Karen P. Lloyd, J.D.
Nancy J. Merrick, M.D.
Judith D. Moore
Diane M. Murdock
Lisa A. Potetz
Kurt F. Price
Dena S. Puskin, Sc.D.
Molly Ryan
Julie A. Sochalski
Eric G. Wedum
Jeannette A. Younes

Technical Appendixes
Table of Contents

Page

INTRODUCTION 1

Appendix A—Hospital Payments and the Update Factor 5

Introduction 7

Medicare Cost Data Accuracy and Timeliness 7
Assessing the Accuracy of the Medicare Cost Report 8
Timely Availability of Medicare Cost Report Data 11
Developing an Early Return Sample of Hospitals Excluded from PPS 12

PPS Payment Adjustments 14
Indirect Teaching Adjustment 14
Disproportionate Share Adjustment 16
Technical Advisory Panel Proceedings 16
Future Staff Activities on Payment Adjustments 17

PPS Market Basket 17

The Discretionary Adjustment Factor for PPS Hospitals 20
Scientific and Technological Advancement 21
Hospital Productivity 24
Site-Of-Care Substitution 30

Development of the Discretionary Adjustment Factor for PPS-Excluded Hospitals and Units 32
Current Status of Excluded Hospitals and Units 32
Scientific and Technological Advancement Allowance 33
Productivity and Efficiency Potential 36

Payment for Capital Under PPS 37
Capital Payment Incentives 37
Options for the Institutional Neutrality Adjustment 38

Rural Hospitals 39
Sole Community Hospital Criteria 40
Sole Community Hosptial Financial Status 45

Appendix B—DRG Classifications and Weighting Factors 47

Introduction 49

Weight Changes Resulting From Recalibration and Grouper Changes 50
Factors Affecting DRG Weights 50
Impact of Recalibration and Grouper Changes 51
Conclusions 52

Recalibration Analysis Comparing Charge-Based and Cost-Based DRG Weights 52
Background 53
Results 53

Conclusions 54
Recommendation 55

DRG Classifications and Weights 55
Topics Under Review 56
Topics For Monitoring 58
Topics Previously Examined 64
Incremental Improvement Studies 70
DRG 468 70
Thrombolytic Agents 76
Multiple Joint Replacement Procedures 77
Respiratory Failure and Mechanical Ventilation 78
Acquired Immune Deficiency Syndrome 82
Specialty Centers and Units 84

Case-Mix Measurement and Coding Issues 90
Current Research on Case-Mix Measurement and Alternative Patient Classification Systems 91
Coding Issues 94

Outlier Payments 95
Analytic Methods 97
Findings 98
Conclusions 105
Recommendation 106

Appendix C—Quality of Care 109
Introduction 111

A Study of the Preadmission Review Process 111
Project Tasks, Methods, and Data Sources 111
Major Findings 113
Conclusions 115

Subacute and Transitional Care 115
Background 115
Preliminary Findings 115
Primary Issues for Further Review 116

Quality Assurance Software: Trends in the Hospital Industry 117
Defining Quality Assurance Systems—Functions and Features 117
Project Methodology 118
Findings From the Software Vendor Survey 118
Findings From the Hosptial Survey 118

The Use and Refinement of Hospital Mortality Statistics 119
HCFA Release of Hospital-Specific Mortality Data 119
Additional Work Underway on Mortality Statistics 121
A Review of Adjustment Methodologies for Hosptial Outcome Studies 121

Appendix D—ProPAC Extramural Studies 127

Appenxix E—Medicare DRGs and Weights for Fiscal Year 1988 135

Introduction

Introduction

This volume of technical appendixes to the Commission's March 1988 report provides background material and detailed analyses supporting the Commission's work this past year. This information was first presented to the Commissioners in the form of staff papers which were written to provide data, information, and analysis of problems. These papers inform the Commission's deliberations and help to shape its conclusions. In this volume, the staff papers have been compiled to provide the reader with relevant background material used in the decision-making process.

Some of the findings presented in the appendix were developed by ProPAC's contractors. Contracted studies are referenced or cited when these were the source of important analysis or information. Much of the work was conducted by ProPAC staff with excellent programming support by ORI, Inc.

Readers seeking an overview of how the Medicare prospective payment system operates should consult the technical appendixes to the April 1985 report. Further information and analysis developed in support of previous recommendations appear in the technical appendixes to the April 1986 and April 1987 reports.

This year's appendixes are presented in five sections. Appendixes A, B, and C relate to the Commission's major responsibilities: updating the PPS payments, adjusting the DRG classifications and weights, and reviewing quality and access to care. Appendix D provides a list and status report on ProPAC's extramural research and studies. Appendix E contains the complete list of DRGs and their fiscal year 1988 weights.

The appendixes, by creating a comprehensive record, seek to facilitate greater understanding of the data and the policy judgments contained in the Commission's 18 recommendations. The Commission also hopes that the reader will find the appendixes to be a useful reference regarding technical details of the Medicare prospective payment system.

Appendix A

Hospital Payments and The Update Factor

Hospital Payments and The Update Factor

INTRODUCTION

The law requires that the Commission recommend each year an appropriate change in PPS payments for hospitals. This annual change is referred to as the update factor. An update factor is also required for hospitals which are exempt from PPS. The statute suggests that several elements be considered in developing the update factor recommendation. These include changes in the hospital market basket, hospital productivity, technological and scientific advances, the quality of health care, and long-term cost-effectiveness.

The update factor recommendation for PPS hospitals combines several components. The largest is the PPS market basket, which is used to estimate inflation in the goods and services purchased by hospitals. The discretionary adjustment factor, or DAF, represents changes in other elements that are relevant to updating payments from year to year. Changes in hospital productivity, site-of-care substitution, scientific and technological advances, and real case-mix change were considered in developing the DAF this year. The Commission also recommends a reduction to offset growth in the case-mix index due to improvements in medical records coding.

In addition, the Commission's recommendation for fiscal year 1989 includes an average 1.1 percent reduction to the standardized amounts. This reduction is the average of a 1.2 percent reduction for urban hospitals and a 0.4 percent reduction for rural hospitals. It is the second-year portion of a reduction that the Commission recommended phasing in over three years beginning in fiscal year 1988. The three-year reduction is intended to adjust PPS payments to account for part of the difference between actual first-year PPS costs and the cost projections underlying the payment rates for that year.

In addition to work related directly to the update factor, ProPAC also examined a number of other important issues which affect the distribution of PPS payments across hospitals. These concerns are reflected in several major analyses which are summarized in materials contained in this Appendix. Some of these materials, as well as additional Commission staff work, will appear as individual papers in ProPAC's Technical Report Series.

Appendix A contains detailed background information on a series of important topics. A study of the accuracy and timeliness of Medicare costs data is reported in the first section. Next, adjustments to PPS payments are reviewed. Discussion of the PPS market basket follows. The next section provides detailed data and information used by the Commissioners to develop the DAF for PPS and excluded hospitals. Payments for capital under PPS is discussed next, and the final section describes ProPAC analysis of rural hospital issues.

MEDICARE COST DATA ACCURACY AND TIMELINESS

One of ProPAC's main priorities is to ensure that its decisions are based on accurate and timely data. Medicare PPS cost data provide valuable information for the Commission's deliberations regarding the update factor, adjustments to the payment amounts, and costs for individual DRGs.

Recently, increased attention has been focused on the timely availability and accuracy of Medicare cost data for analyzing the effects of PPS. PPS margins analyses conducted by ProPAC, CBO, and the HHS Inspector General's Office using cost report data have raised industry concerns regarding the validity of these data. Members of Congress have expressed concern about the lack of timely data for use in legislating changes in national health policy. Finally, the accuracy of cost report data has been questioned because these data have become less important in determining individual hospital payments under PPS.

The analyses described below focus on assessing the accuracy, validity, and timeliness of Medicare Cost Report data under PPS. Information on cost data sampling strategies for excluded hospitals is also provided.

Assessing The Accuracy Of The Medicare Cost Report

ProPAC contracted with SysteMetrics/McGraw-Hill, Inc. (SMI) to study the strengths and weaknesses of the Medicare Cost Report (MCR) (Contract No. T-47540316). This study assessed changes in hospital accounting, cost report filing, and auditing practices since the introduction of PPS as well as the extent to which these changes affect the comparability of data across years. The project included a background paper and telephone interviews with hospital industry representatives, fiscal intermediaries (FIs), consultants, accountants, and financial experts. A summary of SMI's work is provided below. The complete SMI study is available in ProPAC's Technical Report Series.

Introduction—The MCR is a mechanism for identifying costs that are reimbursed by Medicare. MCR reporting guidelines limit reimbursable costs for certain items, define the methods hospitals can use in apportioning costs between Medicare and other payers, and constrain hospitals' ability to change cost reporting practices. Despite these guidelines, substantial variation exists among hospitals in accounting and reporting practices used to develop data for the cost report.

Under cost reimbursement, hospitals attempted to maximize their Medicare reimbursement by allocating as many costs as possible to cost centers heavily used by Medicare patients. PPS added a new dimension to these practices because inpatient operating costs are reimbursed on the basis of fixed prospectively determined rates while capital and some other costs are reimbursed on a reasonable cost, or pass-through, basis.

Adequacy of the Medicare Cost-Finding Methodology—Two concepts are essential to understanding the MCR costing methodology—cost allocation and cost apportionment. *Cost allocation* is the process of assigning overhead costs (or general service center costs) to revenue-producing cost centers. These overhead costs are allocated through a process referred to as "step-down." In the step-down process the costs of each overhead department are allocated to other departments until all costs are assigned to revenue-producing centers. *Cost apportionment* is the process of distributing all costs between Medicare and other payers. Costs are apportioned by ancillary department using the ratio of costs to charges applied to gross Medicare charges (RCCAC).

Hospital and FI respondents differed on whether the MCR adequately identifies the costs of providing services to Medicare beneficiaries. Of the hospital representatives interviewed, 72 percent responded that the MCR was not adequate, while 70 percent of the FIs responded that it was. Most of the dissatisfaction with Medicare's approach to cost finding was because certain costs are not allowed by Medicare. These include cafeteria, telephones, televisions, and non-Medicare bad debt.

Allocation—The step-down allocation process can affect Medicare reimbursement. The methods and statistics determine the costs allocated to each revenue-producing center. For example, housekeeping costs can be allocated on the basis of square footage or time actually spent in each unit. If square footage is used, additional costs would be allocated to routine care and outpatient units, which are relatively large in size. If time spent is used, a greater percentage of costs would be allocated to operating rooms because of higher cleanliness standards.

All of the FIs felt that the step-down method of allocation was reasonable for assigning costs, as did 76 percent of the hospital respondents. Most of the hospital respondents (63 percent) stated that some of the statistical bases for allocation did not accurately assign costs. The problems most often mentioned involved the allocation of administrative and general costs as well as some other overhead costs.

Apportionment—The adequacy of the MCR in determining the cost of treating Medicare patients depends, in large part, on the manner in which ancillary costs are apportioned between Medicare and other payers. Providers have attempted to enhance Medicare reimbursement through charging a higher mark-up on services that are predominantly provided to Medicare beneficiaries. This practice increases the costs that are apportioned to the

Medicare program. The incentive to do this, however, is not as strong since PPS began because most payments are not affected.

In the interviews, 41 percent of the hospital respondents noted they had changed their pricing strategies since PPS began. These changes were most prevalent in chain hospitals, teaching hospitals, and hospitals with more than 100 beds. Changes in outpatient and ambulatory surgery departments were most affected. The majority of hospitals did not expect changes in the charge structure to achieve greater accuracy in cost reporting. Instead, changes were made to increase Medicare reimbursement and to respond to preferred provider organization competition.

The FIs have no practical means of monitoring whether hospitals are increasing charges for services furnished primarily to Medicare beneficiaries. Eighty percent of the FIs interviewed, however, felt that there had been changes in hospital pricing strategies.

Strengths of the Cost Reporting Methodology—While the responses indicated areas for concern regarding the uses of the MCR, it does have some significant strengths as a cost-finding tool. The step-down allocation of overhead costs intuitively makes sense and the allocation statistics are easily obtained in most hospitals. Furthermore, cost apportionment between Medicare and other payers on the basis of charges is understandable and easily achieved using data readily available to hospitals.

Changes in Cost Reporting Practices—To receive payment, hospitals must comply with a variety of requirements in reporting costs. Hospitals can change overhead cost allocation methods and the statistical bases for allocating costs. If they choose a method other than step-down, however, the hospital must first obtain the approval of the FI. Hospitals can also change the apportionment methods by adjusting the ratio of Medicare to total charges. While this behavior will not affect PPS payment, the apportionment of outpatient, capital, and other pass-through costs might still be influenced.

Many of the criticisms leveled at the MCR existed long before the initiation of PPS. PPS created clear incentives, however, for hospitals to increase the costs for capital, direct medical education, distinct-part units, and outpatient departments. Improved reporting of these costs may affect the comparability of MCR data before and after PPS implementation.

Capital—Prior to PPS, hospitals had the incentive to expense capital items to declare the entire cost for reimbursement purposes in the current year. PPS reversed this incentive by treating expensed items as operating costs and thus including them in the PPS payment. Capital costs continue to be paid as a pass-through. Capital was identified by 20 of the 46 hospitals (43 percent) as a major area in which they were focusing their attention to maximize reimbursement. Half of the FIs named capital as their number one audit priority, while 40 percent named pass-throughs in general.

Hospitals' ability to manipulate capital costs is limited. During the PPS transition to national rates, hospitals could not change their policies for capitalizing or expensing of assets. If a hospital expensed all minor equipment in the base year or set a capitalization threshold, this policy had to be followed during the transition. Nevertheless, PPS left hospitals some room to maneuver, such as combining purchases of moveable equipment. This strategy could raise the total price to exceed the hospital's base year capitalization threshold. Of the hospitals interviewed, 48 percent acknowledged increased efforts to combine their purchases. Several noted, however, that their decision was driven by the number of items needed and requirements for volume discount purchases, not by Medicare capital payment policy.

PPS also provides incentives for hospitals to substitute capital for labor. Of those interviewed, 22 percent of the hospitals reported evidence of such a tradeoff, particularly in laboratory and computer services purchases.

Direct Medical Education—Under PPS, costs associated with the patient care component of medical education are included in the DRG payment. The direct costs of education are a pass-through. Direct medical education costs are not a large share of costs in most hospitals. They can be substantial in large teaching hospitals, however. Consistent with other pass-through costs, the 15 teaching hospitals in the survey focused efforts on

maximizing direct medical education costs to increase Medicare reimbursement.

Distinct-Part Units—Hospitals can increase reimbursement by opening distinct parts units. These are designated psychiatric and rehabilitation units which are excluded from PPS. Most of the FIs (90 percent) responded that hospitals were opening more distinct-part units. Twenty-two of the hospital respondents had opened distinct-part units since PPS. Most of the units had 20 to 30 beds. The most prevalent were skilled nursing facility, rehabilitation, and psychiatric units. Forty-seven percent of the hospitals sponsored home health agencies, half of which had opened since PPS. Three of the nine small rural hospitals had instituted swing bed programs.

Outpatient Services—Hospitals can also alter their charge structures to shift costs to services provided to Medicare outpatients. Of the hospitals responding, 24 percent mentioned outpatient care as one of the areas in which they attempted to adjust relative charges to enhance reimbursement.

Changes in the Level of Reporting Effort and Auditing Practices—Prospective payment for Medicare inpatients has reduced the financial incentive for hospitals to identify and report all of their inpatient operating costs. There has been some concern that the quality of the cost data has declined since PPS. Most hospital and FI respondents indicated that the quality of the data had not changed since PPS, however.

Level of Reporting Effort—Some respondents believed that cost report preparation effort had increased. The proper identification and reporting of pass-through costs (e.g., capital and direct medical education) required more attention. Also, hospitals are required to complete additional forms by HCFA. While many hospitals felt that PPS would reduce their overall reporting requirements, 39 percent reported an increase in the level of effort. Of the FIs interviewed, 60 percent felt that hospitals had increased their reporting effort.

Fiscal Intermediary Audit Practices—Some FIs complained that budget constraints forced them to perform fewer field audits in recent years. They asserted that the funding level did not allow them to perform a thorough audit. Of the hospitals interviewed, 28 percent stated that the level of FI auditing had remained the same. Another 23 percent stated it had declined substantially.

Fiscal intermediaries have operated under tight budget constraints in recent years and 80 percent of the FIs expressed concern about the seriousness of these constraints. The FIs verified the industry's observations—60 percent felt that these constraints resulted in fewer field audits or less field time per audit. On the other hand, only 20 percent stated that the time and effort FIs invest in auditing had declined since PPS. Finally, 40 percent of the FIs felt that the turnover rate for auditors had increased and 50 percent felt it resulted in a decline in data quality.

HCFA has identified pass-through areas as audit priorities, and FIs have redirected their efforts into these areas because they are weighted heavily in their annual evaluations. Eighty percent of the FIs stated that the emphasis of the audit had changed to focus on capital and other pass-through areas.

Suggestions for Improving the Medicare Cost Report—In response to a question about improving the MCR, hospital and FI interviewees' most frequent response was that the MCR could be improved by simplifying it. They also responded that information that was no longer necessary for reimbursement purposes should be removed from the report. Some individuals were skeptical about attempts to simplify reporting requirements, however. Respondents indicated that, while hospitals are aware of the inaccuracies inherent in the MCR, they understand the system and are wary of changes in reporting requirements.

Conclusion—The MCR is acceptable as a reimbursement tool, but not, in the view of hospital respondents, as a tool to measure costs. Most hospitals felt that the MCR does not accurately reflect the cost of care for Medicare beneficiaries because Medicare excludes certain costs.

PPS has resulted in changes in reporting practices as well as in the provision of care. These changes, however, do not necessarily indicate inadequacies in the MCR, but indicate that hospitals are responding to the new reimbursement incentives. Some of the changes will result in differences in cost data over time. The overall effect on

data comparability is unclear, however. This study was not designed to measure the changes, but rather to identify factors that might influence MCR data comparability over time. The study does provide general impressions about the relative importance of the factors.

Timely Availability Of Medicare Cost Report Data

The Congress, the Commission, and others involved in evaluating the Medicare program have been concerned about the timeliness of MCR data. The Commission, therefore, initiated an effort to examine the process of submitting Medicare cost reports and compiling these data to identify methods to shorten this process. Staff reconnaissance on the timeliness of Medicare cost report data is described below. Included is information on the cost report submission process, the consequences of changing the cost report form, and methods for shortening the reporting process.

Cost Report Submission Process—Hospitals have 90 days from the end of their accounting year to submit their Medicare cost report to the FI. The FI performs an initial review of the cost report and submits it to HCFA within 90 days of receipt from the hospital. HCFA performs additional edits on the "as submitted" data and adds the cost report data to the Hospital Cost Report Information System (HCRIS) file. HCFA then produces an abstract of the HCRIS file, referred to as the minimum data set. The minimum data set is the cost report file used by ProPAC in its analyses. As the cost reports are settled, they are added to the HCRIS and minimum data set files.

HCFA checks the "as submitted" data from the FI for completeness and accuracy. If no potential problems are revealed, the cost report data can be abstracted for the minimum data set within a few days. Generally, HCFA produces an updated minimum data set every quarter, but this update could be more frequent, if necessary.

During the 90-day period at the FI, the cost report is key-punched into the FI's computer system. Then it is subjected to a series of edits performed by one of four software packages sold by commercial vendors. The FI completes the initial desk audit by performing additional checks of the accuracy of mathematical calculations and the consistency of some of the data elements.

The cost reports receive additional attention from the FI after the "as submitted" versions are sent to HCFA. This more extensive desk audit includes reconciling work sheets, reviewing financial statements, and additional comparative analyses. The FI also determines whether an extensive field audit is necessary. The field audits and final settlement of these cost reports usually is completed within one year of hospital submission.

Thus, "as submitted" data can be available for the HCRIS file within six months following the hospital accounting year end. Table A-1 shows the distribution of hospitals by the beginning of their accounting years. Approximately 22 percent of the

Table A–1. Cost Reporting Process for Third Year of PPS (October 1, 1985 to September 30, 1986)

Hospital Accounting Years Beginning Date	Period Covered	Percent of PPS Hospitals[a]	Date Medicare Cost Report Submitted to FI	Date Medicare Cost Report Submitted to HCFA (HCRIS)
October 1, 1985	October 1, 1985 – September 30, 1986	22	January 1, 1987	April 1, 1987
January 1, 1986	January 1, 1986 – December 31, 1986	30	April 1, 1987	July 1, 1987
April 1, 1986	April 1, 1986 – March 31, 1987	3	July 1, 1987	October 1, 1987
July 1, 1986	July 1, 1986 – June 30, 1987	33	October 1, 1987	January 1, 1988

a The remainder of the hospitals (12%) have accounting years that start throughout the rest of the year.

PPS hospitals have accounting years that correspond to the Federal fiscal year (October 1 through September 30). The cost reports from these hospitals could be ready for the minimum data set as early as April of the following Federal fiscal year.

Consequences of Changing the Cost Report—Cost reports for the first year of PPS (accounting years starting in Federal fiscal year 1984) were not available for analysis until approximately two years after the end of the Federal fiscal year. This long delay in the availability of the data was caused by the significant changes made to the cost reporting forms. It took a considerable amount of time for HCFA to modify the reporting form. Thus, the form was not available to distribute to hospitals until well after the end of some hospitals' accounting years. This, in turn, delayed hospital submissions to the FI. It also delayed availability of the software packages used by the FI to perform desk audits. Finally, HCFA needed additional programming time to abstract data for the minimum data set.

In contrast, a file containing PPS3 (accounting years beginning in Federal fiscal year 1986) cost report data for almost 3,000 hospitals was made available in August 1987. The complete file is also expected on a timely schedule. HCFA was able to issue this file so quickly because the cost report document remained virtually unchanged from the previous year.

In addition to delaying the availability of data, significant changes to the cost report inhibit longitudinal analyses that rely on cost report data. This is a major concern because of the importance of longitudinal analyses in assessing the relationship between costs and payments over time and in evaluating the effects of PPS.

Methods for Shortening the Reporting Process—Additional strategies could reduce the lag time for cost report data. These include the following:

Require hospitals to submit cost report data to the FI in a machine-readable form—This would eliminate the need for the FIs to key-punch these data. This may not increase the timeliness significantly, however, because the key-punching process generally only takes a few days at the FI. Further, all hospitals would be required to purchase automated cost report processing software.

Require FIs to abstract key data elements after the initial editing to send directly to HCFA—This would make selected data available in a more timely fashion. The FI, however, may need additional time to complete their review because this would add another step to their processing efforts. It may compromise the accuracy of the data because the abstracted data elements would not be subjected to the complete desk audit by the FI. In addition, it may increase the time HCFA would need to prepare the data for submission to HCRIS because of limited editing by the FI.

Require hospitals to submit cost report data directly to HCFA for HCRIS input at the same time data are submitted to the FI—This would make preliminary data available before the 90-day FI processing period. This may seriously compromise the accuracy and timing of the data because the directly-submitted data would not be edited by the FI. To maintain current accuracy and timeliness standards, HCFA may need additional resources.

Shorten the 90-day FI processing period—Given current resources, the FI may not be able to significantly shorten processing time without reducing reliability of the data. Additional resources would probably be needed to maintain current standards.

Shorten the time hospitals are allowed to prepare the cost report—This would speed up the overall cost data processing cycle. The cost report requires financial information that is not available until a year-end audit has been completed, however. Shortening this time period could jeopardize the integrity of the cost report and place additional administrative burdens and costs on hospitals.

Developing An Early Returns Sample Of Hospitals Excluded From PPS

Last year, the Commission recommended that Medicare cost report data be routinely collected from an "early returns" sample of hospitals (e.g., those with accounting years that end early in the Federal fiscal year). The data tape issued by HCFA in August 1987, with third-year PPS cost report data for almost 3,000 hospitals is very similar to the early returns sample.

In addition to recommending updates to the PPS payment amounts, the Commission also is required to annually recommend an update for these excluded hospitals. Timely cost data, therefore, is equally important for hospitals that are excluded from PPS and subject to the rate of increase limitations. Thus, the Commission undertook analysis to determine how an early returns sample could be developed for excluded hospitals. The results of this analysis are described below.

Summary of Findings—The early returns sample, appropriately weighted, would provide a representative sample of hospitals excluded from PPS. The sample would be relatively small, however, and may not be adequate to evaluate the costs of specific types or subsets of excluded hospitals. Thus, the sample would be useful for some applications and of limited use for others. To significantly increase the number of hospitals in the sample would increase the lag in the availability of the data by five months.

Methods and Results—The analysis evaluated the representativeness of an early returns sample of excluded hospitals, replicating the previous evaluation of early returns PPS hospitals. As in the previous analysis, early returns hospitals are defined as those with accounting years beginning in the first four months of the Federal fiscal year. Four types of excluded hospitals were studied: long-term care, psychiatric, rehabilitation, and children's.

The data used for this analysis included hospital variables from the MCR for the second year of PPS (PPS2). The sample consisted of the hospitals excluded from PPS that had a PPS2 MCR with complete data on all the variables examined in the analysis. The sample size was 1,332, of which 396 (30 percent) were early returns hospitals.

Comparisons of the early returns hospitals with the other excluded hospitals demonstrated that the early returns hospitals are significantly different in several respects. They are less likely to be from the Northeast (largely New England) and more likely to be from the Midwest (East North Central region). They are also less likely to be government owned rather than private voluntary or proprietary. Early returns hospitals also are more likely to be located in high wage areas.

The early returns sample is not significantly different from the other hospitals in the mix of rural and urban, bedsize, rural and urban by bedsize, or type of excluded hospital. Further, the sample did not differ by the number of Medicare discharges or days; teaching status; discharges per bed; percent of Medicare, Medicaid, or dual-eligible admissions; or Medicare inpatient operating costs per admission and per day.

Several weighting schemes were examined to remove the imbalance in the sample. A simple weighting scheme was developed that successfully remedied the imbalance. The weights were based on urban or rural status, census division, and type of hospital control. Thus, the early returns sample of excluded hospitals, once weighted, appears to be representative of all excluded hospitals.

Estimates of hospital average costs (i.e., Medicare operating costs per admission and per day) are not significantly different for the weighted sample of early returns hospitals compared to the other excluded hospitals. The precision of these cost estimates, however, is much lower than for the entire set of excluded hospitals.

The precision is lower for the early returns sample because the sample is small (396 hospitals), and the distributions of Medicare operating costs per admission and per day are skewed. The precision of the estimates could be improved by expanding the definition of early returns to include hospitals with later reporting periods. To substantially increase the number of hospitals, however, the early returns sample would have to include hospitals that have accounting years that begin before July. The expanded early returns sample would then include hospitals that have accounting years that begin in the first nine months of the Federal fiscal year. Thus, the benefits of the early returns concept would be lost. Further, even with the expanded sample, the precision of the cost estimates may be unacceptably low for some uses.

The second source of imprecision in cost estimates, the skewed distributions, can be dealt with in another way. Much of the skewness is due to hospitals with extreme costs but few total cases. The precision of the cost estimates is greatly improved if case-weighted averages are computed. While there are important distinctions between

case-weighted and hospital-weighted averages, both are useful and appropriate measures of cost.

PPS PAYMENT ADJUSTMENTS

The Medicare prospective payment system radically restructured the method of paying hospitals for care delivered to Medicare beneficiaries. PPS is a fixed-price payment method. The system has some features to recognize variation in hospital costs, however. These features include separate urban and rural rates, adjustments for area wage rates, and adjustments for the indirect costs associated with teaching. In March 1986, an adjustment to hospitals that serve a disproportionate share of low income patients was added to PPS.

This section reviews the development and current status of the indirect teaching and disproportionate share payment adjustments. It also outlines the major policy issues surrounding these adjustments, and discusses the Commission recommendation on these issues.

Indirect Teaching Adjustment

In 1972, the Congress enacted authority to set limits on Medicare reimbursement levels for routine per diem hospital costs under Section 223 of the Social Security Act. As implemented, the cost limits included adjustments for hospital size, urban or rural location, and area wage rates.

In 1980, HCFA introduced a new payment adjustment to the 223 limits for the indirect costs associated with teaching. This adjustment recognized the higher costs of hospitals with graduate medical education programs. Some factors contributing to these higher costs are the greater use of ancillary services, more severely ill patients, location in inner cities, and a more costly mix of staffing and facilities. The indirect teaching adjustment was defined using the ratio of interns and residents per bed (IRB).

In its original PPS plan, the Administration included an indirect teaching adjustment. Teaching hospitals would receive an additional payment per case, with the percentage adjustment depending on the IRB. The proposed formula for calculating the additional payment adjusted per-case payments 5.79 percent for every 0.1 percentage point increase in the IRB.

The Administration's adjustment formula was based on estimates derived from regression analysis using 1981 Medicare cost report data. Regression analysis was used to isolate the contributions of several factors to the variation in Medicare costs per case. Factors included in the regression analysis were urban/rural location, indirect teaching (IRB), DRG case mix, area wages, bed size, and MSA population.

To assess the impact of the proposed payment rules, the Congressional Budget Office (CBO) compared the expected distribution of payments to hospitals under PPS to the then-existing cost-based distribution. Even with the indirect teaching adjustment, the Administration-proposed distribution was adverse for teaching hospitals. Specifically, CBO reported that 71 percent of the teaching hospitals would have had payment reductions under national PPS rates.

Congressional concern about the degree of adverse impact of PPS on teaching hospitals resulted in a doubling of the 5.79 percent adjustment to 11.59 percent for fiscal years 1984 and 1985. The rationale was that, in addition to compensating these hospitals for indirect teaching effects, the adjustment would serve as a partial correction for the system's inability to account for other factors that legitimately increase costs in teaching hospitals. In particular, there was concern about the ability of DRGs to account for the higher severity of illness of patients in teaching hospitals.

The double teaching adjustment quickly became a target for budget cutting strategies. In part, this may have resulted from equity concerns about the distribution of payments between teaching and nonteaching hospitals. In addition, the burgeoning Federal budget deficit increased pressure for savings in the Medicare program.

At the same time, analysts began to explore alternative methods to calculate the indirect teaching adjustment. One method used a payment regression model. In this form of regression analysis, only payment system factors are included to explain per case cost variation: area wage rates, hospital case mix, urban/rural location, outlier payments, disproportionate share status, and indirect teaching. These factors are also constrained to

represent the manner they are included in the payment system. For example, the dependent variable (Medicare cost per discharge) is divided by the hospital's case-mix index to adjust for variations in case severity across hospitals.

Other factors that are associated with cost variation but are not part of the payment system, such as hospital bed size and MSA size, are excluded from a payment regression model. These excluded factors tend to be correlated with teaching status. Excluding factors from the regression model that are correlated with teaching status has the effect of raising the estimate for indirect teaching. The resulting teaching estimate, therefore, becomes a "proxy" for excluded factors correlated with teaching status and contributing to cost variation.

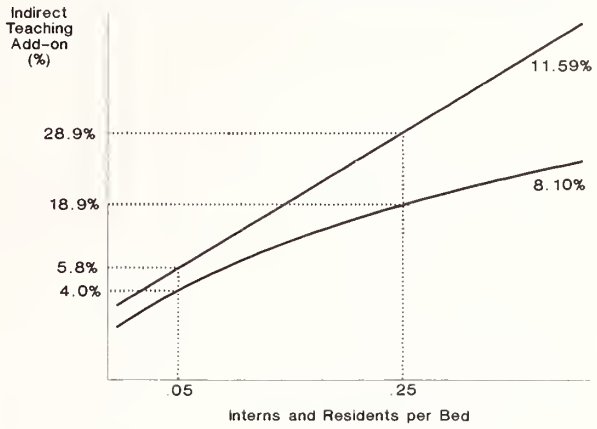
The proxy effect of the indirect teaching estimate has been debated by the hospital industry, the Administration, and the health services research community. Some of the factors reflected in the teaching estimate (e.g., severity of illness) are generally felt to be appropriate. However, there is disagreement about the appropriateness of other factors captured in the estimate, such as bed size and large city location.

Using different payment regression models and data from the 1981 Medicare Cost Report, CBO produced a range of indirect teaching estimates based on different regression models. The Congress enacted an adjustment of 8.1 percent beginning during fiscal year 1986.

The 8.1 percent adjustment was also applied differently, and more appropriately, than the 11.59 percent. The formula used to apply the 11.59 percent adjustment assumed that costs per case increase at a constant rate with increasing IRB. Actually, with increasing IRB, Medicare costs per case increase at a decreasing rate, rather than at a constant rate.

The result was that under 11.59 percent adjustment, large teaching programs received an inappropriately high teaching adjustment. The new formula used with the 8.1 percent adjustment corrected the problem, as illustrated in Figure 1. A major teaching hospital with an IRB of .25 received a payment add-on of 28.9 percent per PPS case under the 11.59 percent adjustment formula. The same hospital received an 18.9 percent payment add-on under the 8.1 percent adjustment. In contrast, a minor teaching hospital with an IRB of .05 received payment add-ons of 5.8 and 4.0 percent under the 11.59 and 8.1 adjustments, respectively.

Figure A-1. Add-on Percentage for Indirect Teaching Under 11.59% and 8.10% Adjustments



Under the current teaching adjustment of 8.1 percent, about 4 percent of PPS payments, or roughly $1.8 billion in 1988 dollars, would be paid to hospitals under fully national rates through the indirect teaching adjustment. Each teaching hospital receives a payment add-on based on the their IRB. The IRB is measured by dividing the number of interns and residents on September 1 or the nearest working day by the average number of beds for the year. Interns, residents, and beds assigned to non-PPS units are not counted.

The current formula used to compute the percent-age add-on is:

$$2 * [(1 + IRB)^{.405} - 1]$$

Over 1,000 PPS hospitals (almost 20 percent) receive indirect teaching payments. The average add-on percentage is about 11.3 percent. This adjustment is substantially larger for major teaching hospitals. Their adjustment represents an add-on to the Federal portion of payment of about 30 percent on average, or $1,350 per case in 1988 dollars. These figures exclude the adjustment paid on the outlier portion of payments.

Beginning in fiscal year 1989, the indirect teaching adjustment has been lowered to 7.7 percent.

CBO estimates that the lowered teaching adjustment will result in a reduction in payments to teaching hospitals of approximately $100 million.

Disproportionate Share Adjustment

The disproportionate share (DSH) adjustment is intended to compensate hospitals for additional costs associated with serving a significant proportion of low income patients. Under PPS, disproportionate share is defined as the sum of 1) the percent of Medicare hospital patient days attributed to Medicare beneficiaries entitled to SSI, and 2) the percent of total hospital days attributed to Medicaid recipients. For all hospitals, the average of this sum is about 15 percent.

The adjustment formula is based on estimates derived from regression analysis using 1981 Medicare cost report data. Estimates for the DSH adjustment are obtained from a more fully specified regression model than that used to estimate the indirect teaching adjustment. The DSH analysis indicates that after a threshold level of 15 percent, a hospital's low income patient share has an impact on Medicare costs. The impact is statistically significant for urban hospitals with 100 or more beds.

The estimates obtained from the analysis are used to define disproportionate share hospitals and to compute the formula for DSH payments. Starting April 1, 1988 DSH payment adjustments will be made using the following formulas:

- Urban hospitals with less than 100 beds and a disproportionate share level of at least 40 percent receive a five percent payment adjustment.

- Urban hospitals with 100 beds or more and a disproportionate share level of at least 15 percent receive an adjustment of 2.5 percent plus one-half the difference between the hospital's disproportionate patient percentage and 15 percent. (Until April 1, 1988, urban hospitals with more than 100 beds have DSH payments capped at 15 percent.)

- Rural hospitals with a disproportionate share level of at least 45 percent receive a four percent adjustment.

Without accounting for recent legislation, payments under the DSH adjustment represent about two percent of total PPS payments under fully national rates ($800 million in 1988 dollars). Like the teaching adjustment, the DSH adjustment is computed as a percentage add-on. Over 1200 PPS hospitals (about 22 percent) receive DSH payments. On average, the adjustment represents an add-on of about six percent, or almost $280 per case before accounting for recent legislative changes. About 95 percent of the DSH payments are made to urban hospitals with 100 beds or more.

The teaching and DSH adjustments are additive, not multiplicative. That is, adjustments are computed as a percentage of the same base for roughly 400 hospitals that receive both adjustments. For example, if a hospital's teaching percentage add-on is five percent and the DSH add-on is 15 percent, the hospital receives a combined adjustment equaling 20 percent of the basic payment rate. Hospitals that qualify for both adjustments receive about 57 percent of the total indirect teaching payments and 65 percent of the DSH payments.

Technical Advisory Panel Proceedings

In the fall of 1987, ProPAC staff convened a technical advisory panel to discuss technical and policy issues involved in the indirect teaching and DSH adjustments. The goals of the meeting were to:

- Critically review the technical basis for the current PPS payment adjustments,

- Identify and discuss the major technical issues underlying the payment adjustment methodology, and

- Outline the major policy issues for further consideration.

CBO presented its analyses supporting the various adjustment options. The panel addressed in detail the technical aspects of the analysis used to derive the adjustments, and the policy implications of the analytic approach. The panel discussion assisted ProPAC staff in planning its future analytic activities. The panel was also useful in helping ProPAC staff prepare options on payment adjustment recommendations for Commission consideration.

The panel made no suggestions for technical improvements in the methodology for estimating PPS payments adjustments. Panelists agreed that the payment regression model, although not perfect, is a reasonable approach for deriving an indirect teaching adjustment that is consistent with current policy goals. Until we are able to adequately isolate and measure all factors affecting cost variation, there is no sound basis for replacing the payment regression with an alternative methodology.

The panel concluded that the adjustment should be reviewed annually for potential revision, as more recent cost data become available and cost patterns of hospitals continue to change.

Finally, there was consensus that significant research effort is needed to identify factors affecting cost variation among hospitals and to improve methods to measure the effects of these factors on costs. This information will enable policy makers to select which sources of cost variation should be paid for through PPS payment adjustments.

Future Staff Activities on Payment Adjustments

ProPAC staff will conduct regression analysis using second- and third-year PPS cost data to analyze sources of variation in Medicare costs per case. This will provide the Commission with updated empirical estimates of indirect teaching and disproportionate share adjustments for consideration. Assessing the adequacy of the IRB as a measure of teaching effort will also be undertaken.

A literature review summarizing alternate ways to measure the effects of selected hospital characteristics on costs is being compiled by SysteMetrics, Inc. under contract to ProPAC. This will provide results on efforts to address the limitations in measurement of factors affecting cost variation. SysteMetrics, Inc. is also under contract to develop a measure of within-DRG complexity of illness. This study will be used to examine the relationship between case complexity and the indirect teaching adjustment.

Recommendation

The indirect costs of teaching and the costs of serving a disproportionate share of low-income patients should be recognized through the use of data-based adjustments to hospital PPS payments. These adjustments should be re-estimated annually using the most recent cost data available. The Secretary should support further research efforts to improve measurement of the sources of hospital cost variation. Results of this research could be employed to improve the overall structure of PPS payments.

PPS MARKET BASKET

The hospital market basket measures the average change in the price of goods and services purchased by hospitals to furnish inpatient care. The projected change in the market basket is one of the integral components of the update factor. The hospital market basket is constructed by (a) specifying the inputs that hospitals purchase, (b) weighting each component to reflect its share of hospital expenses, (c) identifying proxy measures of price change for each input, and (d) forecasting price changes. The overall change in the market basket is computed by multiplying each component's price change by its weight, and summing across all components.

As of January 1988, the projected increase in the PPS hospital market basket is 5.1 percent in fiscal year 1989.[1] Table A-2 shows the relative weights and the projected increase in Medicare market basket components for fiscal year 1989. Wages and salaries represent the largest single component, accounting for 56 percent of costs. Employee benefits and pharmaceuticals are the next largest categories, comprising about nine percent and six percent of the market basket, respectively. The largest projected increases are for malpractice insurance (19.4 percent) and pharmaceuticals (7.2 percent).

PPS Market Basket For Wages

The projected increase in wages and salaries, as measured by the PPS market basket, is 5.1 percent in fiscal year 1989. Table A-3 shows the relative weights and projected increase in HCFA's Hospital Occupational Index which measures the rate of change in the wage and salary component of the market basket. The occupational index breaks down hospital employees into nine job categories, the largest four being professionals and technicians, service workers, clerical workers, and managers.[2]

Table A-2. Relative Weights and Projected Increase in Medicare Market Basket Components, 1989[a]

Category of Costs	Relative Importance[b]	Projected Increase
Wages and Salaries	56.49	5.1%
Employee Benefits	9.31	4.9
Professional Fees	0.82	5.3
Medical Fees	0.00	NA
Other Fees	0.82	5.3
Capital	0.00	NA
Utilities	2.11	5.5
Fuel Oil, Coal and Other Fuel	0.56	6.8
Electricity	0.99	4.5
Natural Gas	0.31	6.5
Motor Gasoline	0.21	5.5
Water and Sewerage	0.04	6.9
Malpractice Insurance	1.76	19.4
All Other Products	20.66	4.4
Pharmaceuticals	5.83	7.2
Food	3.36	4.3
Contract Services	2.02	3.9
Direct Purchase	1.34	4.8
Chemicals and Cleaning Products	2.43	1.6
Surgical and Medical Instruments	2.09	3.5
Photographic Supplies	2.07	3.6
Rubber and Plastics	1.82	3.2
Paper Products	1.11	3.9
Apparel	0.89	3.1
Minor Machinery Equipment	0.40	4.3
Miscellaneous Products	0.66	4.5
All Other Services	8.86	4.7
Business Services	3.03	4.1
Computer and Data Processing	1.65	6.6
Transportation and Shipping	1.00	4.8
Telephone	0.78	3.2
Blood Services	0.50	6.5
Postage	0.28	1.4
All Other Services: Labor Intensive	0.98	4.3
All Other Services: Nonlabor Intensive	0.64	4.8
TOTAL	100.00	5.1

NA=Not Applicable

a The HCFA input price index excludes capital, medical education, and medical professional fees.

b Relative importance is based on inflated 1982 weights.

SOURCE: DRI Fourth Quarter 1987 Forecast.

Changes in professional and technical workers' wages are measured by a 50-50 blend of the Average Hourly Earnings (AHE) for Non-Supervisory Hospital Workers and the Employment Cost Index (ECI) for Professionals and Technicians. For fiscal year 1989 the projected increase in the AHE for hospital workers is 5.5 percent and the projected increase in the ECI for professional and technical workers is 5.3 percent. Wages in the other eight occupational categories are measured by the ECI for each category.

Differences Between the ECI and AHE—The AHE and ECI measure wages differently. The AHE wage series pertains only to production workers within a given industry. The ECI, on the other hand, measures wages for given occupations across all industries and includes supervisory personnel. Skill-mix changes affect the AHE but not the ECI. For example, if hospitals replace LPNs with RNs, the AHE for hospitals would increase, since a higher percentage of hospital workers would be in higher paying occupations. Such a shift would not affect the ECI, since the proportion of workers in a given occupation category remains constant.

In contrast to the industry-specific AHE data, the ECI used in the market basket is external to the hospital industry. The Department of Labor has developed an ECI for hospitals, but only one year of data is available. Roughly 30 percent of the wage component in the PPS market basket is internal to the hospital industry and 70 percent is external.

The annual percentage increase in the AHE for hospital workers has historically been slightly higher than the overall wage component of the PPS market basket (see Figure 2). Only in 1984, the first year of PPS, was the increase in the AHE lower than the increase in the market basket wage component. The AHE, on average, has been 1.0 percent higher than the market basket wage component since 1980. The higher rate of increase occurs because hospital wages tend to grow faster than other wages and hospital skill mix tends to increase in complexity.

Effects of a Nursing Shortage on Market Basket Forecasts—The current nursing shortage could cause hospital wages to increase faster than forecasted.[3] Data Resources, Inc. (DRI), which forecasts the PPS market basket for HCFA, has not modified their forecast model to account for this. The AHE for hospital workers, nevertheless, is the fastest growing portion of the market basket wage component. The market basket should capture higher increases in nursing wages or other hospital

Table A-3. Relative Weights and Projected Increase in the HCFA Hospital Occupational Index, 1989[a]

Employment Category	Relative Importance[b]	Projected Increase	Wage Proxy
Professionals and Technicians	29.7	5.5%	Average Hourly Earnings for Nonsupervisory Hospital Workers
	28.9	5.3	Employment Cost Index (ECI), Wages and Salaries, for Professionals and Technicians
Managers	7.3	5.4	ECI for Managers/Administrators
Sales	0.3	4.3	ECI for Sales Workers
Clerical	12.3	5.0	ECI for Clerical Workers
Craft and Kindred	2.3	3.6	ECI for Craft/Kindred Workers
Operatives Except Transport	0.9	3.5	ECI for Operatives Except Transport
Transport Operatives	0.2	3.7	ECI for Transport Operatives
Nonfarm Laborers	0.2	4.0	ECI for Nonfarm Workers
Service Workers	17.9	4.3	ECI for Service Workers
TOTAL	100.0	5.1	

a The HCFA Hospital Occupational Index is used to measure the rate of increase in the wage and salary component used in the Medicare market basket for hospitals.

b Relative importance is based on inflated 1982 weights.

SOURCE: DRI Fourth Quarter 1987 Forecast.

wages through the AHE for hospital workers. However, since market basket wages are measured by a blend of the AHE and external wage measures, only part of the higher increase in hospital wages will be included in the PPS market basket.

Increases in average starting and maximum nursing salaries are measured by an annual survey of hospitals conducted by the University of Texas Medical Branch at Galveston.[4] Between 1982 and 1984 these average salary increases were less than the increase in the market basket wage component. They were higher in 1986 and 1987. The increase in nursing wages was lowest and the furthest from the market basket wage increase in 1984, possibly because of the uncertainties and cost containment incentives of the new PPS. Increases in average maximum nursing wages have been higher than increases in average starting nursing wages in all but the first year of PPS. In 1987 maximum nursing salaries increased by 5.8 percent, almost two percent more than the market basket wage component, the largest difference since 1981.

The nursing shortage has not yet had a significant impact on the market basket forecast. Generally, wages should increase during a shortage since demand exceeds supply. During the last nursing shortage (1980-1981), nursing wages increased substantially more than other wages. The internal wage proxy (the AHE for non-supervisory hospital workers) reflected these higher increases in wages. While the increase in the AHE was lower than the rise in nursing wages, it was still substantially more than the increase in other wages.

The market basket forecast used in the March Report will be revised several times before it is used in determining the final 1989 update factor. More recent data may show higher hospital wage and other cost increases than previously expected, which would subsequently be reflected in new forecasts. If the final forecast used to update the fiscal year 1989 PPS standardized amounts understates wage changes, the forecast error correction could be used as a final means to account for such mistakes.

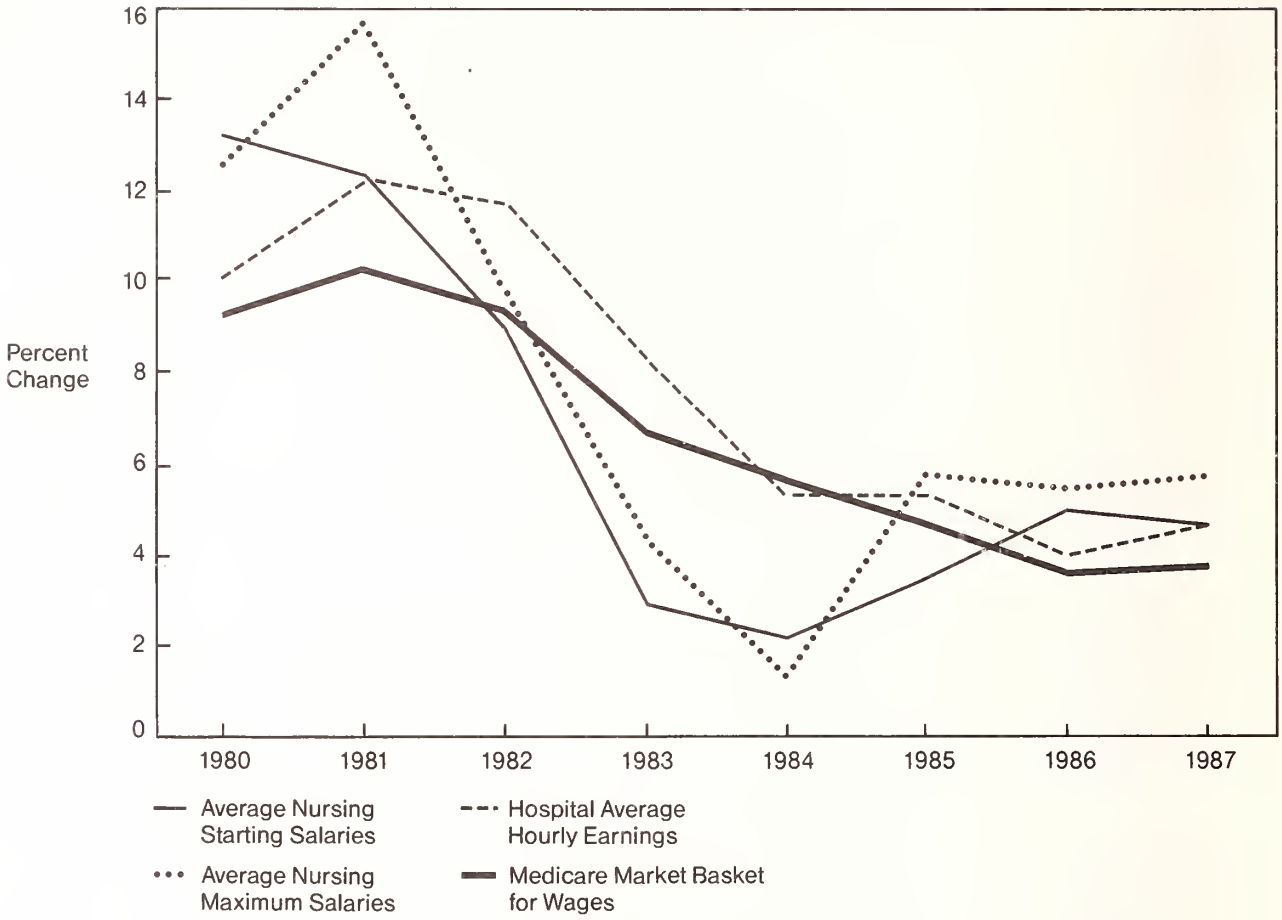
Notes to PPS Market Basket

1. This and all forecasts presented in this section are based on DRI's 1987 fourth quarter forecasts.

2. Professionals and technicians include computer specialists, engineers, lawyers, physicians, dentists, nurses, teachers, scientists, and researchers.

3. For a good discussion of the current nursing shortage see Linda H. Aiken and Connie

Figure A-2. Annual Percent Change in Hospital Wage Measures



SOURCE: Health Care Financing Administration and National Survey of Hospital and Medicare School Salaries.

Flynt Mullinix, "The Nurse Shortage: Myth or Reality?" *New England Journal of Medicine*, Vol. 317, No. 10, p. 641-646, September 3, 1987.

4. *National Survey of Hospital and Medical School Salaries*, University of Texas Medical Branch at Galveston, 1979-1987.

THE DISCRETIONARY ADJUSTMENT FACTOR FOR PPS HOSPITALS

In developing the Discretionary Adjustment Factor (DAF) recommendation, the Commission is concerned with identifying factors that change the average cost of a discharge and determining the effect of changes on the standardized amounts. Among the factors examined are: (1) scientific and technological advancement, (2) hospital productivity improvement, (3) site-of-care substitution, and (4) real case-mix change.

It is difficult to estimate precisely the effect of any single factor. Available data frequently relate to more than one factor because they are so closely related. Nevertheless, the Commission has developed a specific allowance for each factor. The individual DAF allowances provide a rationale for explaining the Commission's judgment. They do not represent precise estimates of any single factor.

After reviewing the data, the Commission concluded that ranges of values were reasonable for both the scientific and technological advancement

allowance and the productivity improvement allowance. Moreover, it concluded that these allowances should roughly offset one another. ProPAC set these adjustments at 0.5 percent, recognizing that other levels could be supported. The Commission further decided that the evidence for a negative site substitution allowance had diminished substantially.

Based on these considerations the Commission recommends that the sum of the allowances for scientific and technological advancement, productivity, and site substitution should be zero in the fiscal year 1989 update. The Commission believes that any additional expenditures for quality-enhancing, cost-increasing technologies and practice pattern changes should be balanced by reductions in resource use associated with productivity gains and shifts in the site of care to non-inpatient settings.

When the recommended increase for real case-mix change is added into the DAF, the total fiscal year 1989 DAF recommendation is a 1.4 percent increase to the standardized amounts. A comparison of the Commission's final DAF recommendations for fiscal year 1988 and fiscal year 1989 is provided in Table A-4.

In the following sections, the allowances for scientific and technological advancement, hospital productivity, and site-of-care substitution are discussed further. There is no technical appendix material on the allowance for real case-mix change.

Table A–4. Comparison of Fiscal Year 1988 and Fiscal Year 1989 Discretionary Adjustment Factors

DAF Component	Percent Change 1988	Percent Change 1989
Scientific and Technological Advancement	+0.5	+0.5
Hospital Productivity	-1.0	-0.5
Site Substitution	-0.3	-0.0
Net Advancement (Before Real Case-Mix Change Adjustment)	-0.8	-0.0
Real Case-Mix Change	+0.8	+1.4
DAF Total	+0.0	+1.4

SOURCE: Prospective Payment Assessment Commission.

Further information about the Commission's approach on real case-mix change will be found in the Technical Appendix to our April 1987 report.

Scientific And Technological Advancement

The scientific and technological advancement allowance is a future-oriented policy target. It does not simply reflect future projections of historical trends. Rather, it represents the Commission's judgment as to the appropriate level of financing for technology advancement in the fiscal year 1989 PPS payment rates. It provides additional funds for hospitals to improve services through the adoption of quality-enhancing, cost-increasing health care advances.

The policy target must ultimately be based on judgment since it is impossible to enumerate all the technologies that meet this definition and to precisely define their costs. In order to develop a more informed judgment, however, the Commission examined a representative set of important new technologies and scientific developments.

Last year, the Commission identified 19 cost-increasing, quality-enhancing technologies that it included in the DAF allowance. Based on its analyses, the Commission estimated that these technologies would add $128 million to the cost of caring for Medicare patients in fiscal year 1988. This translated into a 0.3 DAF percentage point allowance.

The Commission increased the allowance to 0.5 percentage points to account for practice pattern changes and technologies not captured by the analysis. At the same time, the Commission noted that cost-increasing changes in practice patterns were also partly accounted for in the real case-mix change adjustment. Moreover, much of the cost associated with new technologies and technology diffusion was paid through retrospective cost-based reimbursement for capital expenses.

This year, the Commission has expanded on its previous efforts. A large number of new technologies were screened with 29 cost-increasing technologies identified through in-depth examination. The Commission estimated that these technologies studied would add approximately $302 million to Medicare costs in fiscal year 1989.

Over 54 percent of this $302.1 million, however, is associated with new cases that would otherwise have not been admitted to the hospital. Only $118 million is associated with substitution cases—cases that would be hospitalized in any event.

The inclusion of all costs associated with new cases in the science and technology allowance is unnecessary because these cases will automatically generate additional DRG payments. However, these cases may be relatively complex or expensive compared to the cases already in the DRGs where the new cases are classified. These additional costs should be reflected in the adjustment for real case-mix change.

Based on this examination, the Commission estimates that the standardized amounts would need to be increased by 0.3 percent. This estimate includes the effects of substituting new for existing technologies. The Commission's recommendation, however, is for a 0.5 percent increase to include technologies and changes in practice patterns not considered in its study.

The Commission's recommendation presumes that, during fiscal year 1989, hospitals will be able to finance their expenditures for new technologies from productivity gains. ProPAC further presumes that Medicare capital payments will be sufficient to accommodate capital expenses associated with the implementation of cost-effective new technologies and treatments. Finally, the allowance for real case-mix change reflects a portion of the dollars associated with cost-increasing, patient-related practice pattern changes.

A more detailed discussion of the methods for developing the technology estimates is provided below.

Developing the Estimates—Under contract to ProPAC, Project HOPE developed the technology-specific cost estimates. A list of 127 technologies for potential inclusion in the study was obtained by: 1) reviewing the technologies studied last year, 2) reviewing the recent medical literature as well as industry publications, and 3) consulting with more than 25 professional societies.

The list was shortened with the aid of a panel of expert consultants, and cost estimates were developed. The experts were asked to select the technologies that met all three of the following criteria:

- The estimated Medicare incremental cost impact of the technology should exceed $0.5 million in the aggregate or $1,000 per case in fiscal year 1989. This restriction is intended to limit the list to major new technologies.

- The technology should be at least five percent and not more than 75 percent diffused into the Medicare population. This criterion assures that the technology is beyond its research phase but not fully diffused and thus not already fully provided for by PPS.

- The technology should be considered safe and effective. Technologies should be FDA-approved and generally accepted in the medical community for inclusion in the allowance.

Thirty-four technologies were chosen—29 cost-increasing and five cost-decreasing technologies. These 34 technologies often represented a consolidation of several technologies into a single category for cost estimation. For example, cardiac output monitoring systems is a category that encompasses many technologies.

Cost estimates were derived for each technology category. Information on costs and use was obtained from the medical literature, market surveys and industry publications, responses from professional societies, and interviews with clinicians.

The estimates include the following:

- Inpatient operating costs only—capital costs are specifically excluded;

- Incremental changes in the use of the technology in fiscal year 1989 compared to fiscal year 1988;

- Changes in costs per case relating to the use of the technology, not just the cost of the technology itself; and,

- Changes in the number of cases as a result of the technology.

The cost estimates for the cost-increasing technologies are summarized in Table A-5. The total increase in Medicare costs attributable to the 29 cost-increasing technologies is estimated at $302 million. Pacemakers, thrombolytic therapy, percutaneous transluminal coronary angiography (PTCA), and the costs of hospital controls for treating patients with AIDS account for the greatest percentage of the increase in total costs.

The estimate for AIDS reflects the additional cost for treating all Medicare patients associated with the presence of AIDS patients in the hospital. For example, the need for more stringent infection control procedures associated with the presence of AIDS patients has resulted in greater use of hospital gloves, more expensive systems for disposing needles, greater use of other disposable supplies, education and training of staff, and other changes that increase the cost of routine hospital procedures.

Table A–5. Estimated Annual Impact of New Cost–Increasing Technologies on Medicare Inpatient Costs

Technology	Amount (in millions of dollars)
Implantable Defibrillator	12.5
Pacemakers (advances)	15.7
PTCA	48.0
Thrombolytic Agents	44.1
Bone Growth Stimulator	0.6
Bone Growth Devices for Spinal Surgery	1.0
Cochlear Implants	2.7
Artificial Urinary Sphincter	0.9
Penile Prosthesis	9.2
Cardic Output Monitoring Systems	0.9
End Tidal CO_2 Monitors	5.0
Mass Spectrometry	2.5
Pulse Oximetry	7.2
Implantable Infusion Pumps	4.0
Patient Controlled Analgesia	2.0
Vascular Access Device	0.8
Hyperthermia Systems	3.6
Doppler Ultrasound	3.3
EEG Brain Mapping Systems	1.8
High Speed Cine CT	0.7
MRI	9.8
PET	11.2
SPECT	14.3
Los Osmolality Contrast Agents	3.2
Monoclonal Antibody Imaging Agent	7.0
Tests for Tumor Markers	1.8
Liver Transplants	3.5
Infection Control for AIDS	84.0
Gastroesophageal Anti-Reflux Device	0.8
TOTAL COST-INCREASING TECHNOLOGIES	302.1

SOURCE: Project HOPE under contract to ProPAC.

The AIDS estimate does not reflect the direct cost of treating Medicare AIDS patients. These direct costs presumably are already covered by the DRG payments. However, the impact of increasing numbers of AIDS patients on overall hospital costs may have a far greater effect on the DAF than can be anticipated based on current information. The Commission plans to examine these issues in more detail as additional information becomes available and make adjustments in both the DAF and the DRG payment amounts as appropriate.

In some cases, a technology may be cost-decreasing when compared to an existing technology but may be cost-increasing in the aggregate because it creates new indications for treatment. For example, PTCA was found to be cost-decreasing when compared to coronary artery bypass surgery for a single patient. However, overall, it was found to be cost-increasing because a number of people who would not otherwise have undergone surgery now receive PTCA.

The estimate for thrombolytic therapy requires special note. Project HOPE initially estimated that $81 million would be associated with expanded application of thrombolytic agents in treating blockage of coronary arteries. These drugs include Streptokinase, Urokinase and Tissue Plasminogen Activator (TPA). Project HOPE estimated that 35,000 Medicare inpatients would be treated with these drugs in fiscal year 1989—5,000 would receive Streptokinase or Urokinase and 30,000 would be treated with TPA.

The cost estimates included the price of the drugs and other indirect costs associated with treatment. Estimates were based on $200 per case price of Streptokinase and $2600 TPA per case price multiplied by the estimated number of cases using each drug.

The Commission modified the estimates to reflect a 50/50 blended price for all thrombolytic

drugs. The list price for TPA of $2332 was blended with the list price for Streptokinase to yield an average price of $1259 per dose for thrombolytic agents. This price was then multiplied by the 35,000 Medicare cases to yield a total estimated incremental Medicare expenditure of $44.1 million in fiscal year 1989. The Commission's estimates reflect the judgment that only the direct costs of the drug should be financed by the DAF.

Table A-6 lists estimates for cost-decreasing technologies. The costs associated with these technologies were not explicitly factored into any DAF component. Rather, these technologies were implicitly considered in the Commission's judgments regarding productivity. As noted in the footnote to the table, these cost-decreasing technologies are potentially cost-saving when compared to the technologies they may replace. It is recognized, however, that over time these technologies may increase costs in the aggregate. As a result, uncertainty surrounds the estimates.

Table A–6. Estimated Annual Impact of New Cost–Decreasing Technologies on Medicare Inpatient Costs

Cost-Decreasing Technology[a]	Amount (in millions of dollars)
Valvulopasty	-9.0
ESWL (kidney and urinary tract)	-11.3
Automated Clinical Chemistry Analyzers	-2.0
Muromonab-CD3 (OKT3)	-5.6
Endoscopic Lasers	-10.8
TOTAL COST-DECREASING TECHNOLOGIES	-38.7

a These cost-decreasing technologies have the potential to save money relative to the technologies they are replacing. However, it is recognized that there is a great deal of uncertainty surrounding these estimates and that, as in the past, potentially cost-saving technologies may end up increasing costs in the aggregate.

SOURCE: Project HOPE under contract to ProPAC.

Methodological Limitations—The estimates are limited in a number of ways. First, the estimates do not capture the impact of improvements in existing technologies, adoption of relatively low cost technologies, or subtle changes in practice patterns. For example, these estimates do not capture the costs of increased monitoring of diabetic patients in the hospital.

Second, the techniques for estimating costs are limited. Definitions of costs vary from study to study. Projections of future use of technologies are subject to wide variations and large uncertainties. Finally, both the literature review and the survey of experts revealed the difficulty of estimating the extent to which new technologies would substitute for or add to the costs of existing technologies. As a result, the estimates may understate the resources required for hospitals to implement technological innovations.

On the other hand, these cost estimates may not be as understated as they appear. Several of the technologies studied have high capital costs but relatively low incremental operating costs.

Technology Study Results—Despite their limitations, the technology-specific estimates provided a valuable beginning point for assessing the funds necessary to accommodate the most prominent improvements in medical science.

Taken together, the 29 major cost-increasing technologies would add no more than $302 million to Medicare operating costs (Table A-5). Of this total, $118 million is attributable to patients who would otherwise be admitted to the hospital and $184.5 million is attributable to patients who would otherwise not be admitted. Cost decreasing technologies were estimated to save a total $38.7 million in operating costs in fiscal year 1989 (Table A-6).

Hospital Productivity

The productivity allowance in the DAF is a future-oriented target. It reflects the potential for changes in both efficiency and productivity resulting from PPS incentives to reduce the number and cost of resources used to treat patients. The adjustment in the DAF for productivity is a general allowance for desired changes in the system that cut across DRGs.

Past productivity trends serve as a guidepost in the Commission's establishment of reasonable productivity targets for the future. In general, Commission analyses indicate little improvement in labor productivity during the post-PPS period. At the same time, the number of services produced per discharge—a measure of intensity—were reduced. This trend appears to have reversed in 1986

and 1987, the last years for which ProPAC has data. The rate of increase in intensity, however, has not returned to the pre-PPS level.

The remainder of this section reviews the information developed to support the Commission's fiscal year 1989 productivity allowance. The first part reviews general productivity concepts, showing that practice pattern changes provide a partial indicator of the potential for future productivity improvement. The Commission's analyses of labor productivity and intensity trends are presented in the third part. A discussion of the implications of the analyses for the DAF conclude the section.

Productivity Concepts and Definitions— Productivity refers to the relationship between resource inputs and products. Increased productivity implies either producing more or higher quality products with the same inputs or producing the same quantity and quality product with fewer inputs. Efficiency relates to the cost of producing a product. Greater efficiency is achieved when more products or higher quality products are produced for the same money, or when the same product is produced for less money. The Commission has not been overly concerned with distinguishing efficiency from productivity gains in the strict economic sense. Its major concern has been to identify reasonable indicators of changes in the hospital production process that result in changes in hospital costs. Examination of these changes, however, is greatly confounded by problems associated with measurement of the hospital product.

Ideally, productivity would be based on precise measurement of the changes in the hospital product that incorporate health outcome, service quantity and quality, and case-mix changes. Such measures are not currently available, however.

In its analyses of hospital productivity, the Commission has defined the discharge as the final hospital product. Nevertheless, the hospital product is constantly changing. For example, the product may change because services are shifted outside the hospital, because of scientific and technological advances, or because the mix of patients in the hospital is changing. Each of these situations can result in either increases or decreases in the observed measures of productivity.

The hospital product is defined at two levels. As mentioned earlier, the final hospital product is the discharge. This product, however, is composed of a series of services (radiology, lab, routine medical/surgical nursing services, etc.) that constitute intermediate products in the production of care during the inpatient stay.

The units of service studied vary by the type of service and availability of data. For example, on the medical/surgical unit, a unit of service is generally expressed as a patient day. In radiology, the service unit could be an x-ray procedure; in the laboratory, it could be a workload unit or lab test. Ideally, the definition of the unit of service would control for changes in the quality and complexity of the services provided. Unfortunately, the majority of service measures reflect simple counts of procedures, tests, or days of care rendered.

The Commission defines resource inputs in terms of various measures of labor resources—paid hours of staff time and full-time equivalent employees. Capital resources are not included in the Commission's analyses. Although capital represents a major component in the production process, capital payments continue to be passed through PPS. Therefore, the incentives for greater productivity under PPS are related to the use of labor and other non-capital resources. Data on non-capital, non-labor resources are extremely limited. For further discussion of these concepts, see the Technical Appendix to ProPAC's April 1987 report.

Practice Pattern Trends—For this report, the Commission began development of the productivity target by examining changes in trends in admissions, length of stay, and staffing ratios.

Admission and Length of Stay Trends—Data on admissions can serve as a proxy for discharges, the Commission's measure of the final hospital product. Hospital admissions have been declining since 1983 (Table A-7). This trend accelerated through 1985, but slowed in 1986. For the population group age 65 and over, however, admission rates did not begin to decline until 1984. Nevertheless, as with admission rates for the total population, rates for those over 65 declined the most in 1985, declined less in 1986, and even less during the first nine months of 1987.

Table A–7. Percent Change in Hospital Admissions for Persons Under Age 65 and for Persons Over Age 65 (In percent)

Year	All Admissions	Admissions Under Age 65	Admissions Over Age 65
1980	2.9	1.5	6.7
1981	0.9	0.0	3.0
1982	0.0	-1.6	4.1
1983	-0.5	-2.8	4.7
1984	-3.7	-4.2	-2.6
1985	-4.9	-4.7	-5.2
1986	-2.1	-2.5	-1.2
1987[a]	-0.7	-1.0	-0.2
Average change 1970–1979	2.6	1.8	4.7
Average change 1980–1983	0.8	-0.7	4.6
Average change 1984–1987[a]	-2.9	-3.1	-2.3

a Estimate based on January through September 1986 compared with January through September 1987.

SOURCE: American Hospital Association Panel Survey.

At the same time, length of stay remained relatively constant for all adults from 1976 to 1982 but fell dramatically between 1983 and 1985 (Table A-8). In contrast, the length of stay for adults over 65 fell almost constantly through 1982 and more dramatically from 1983 to 1985. In 1986, length of stay increased for all adults and no decline was shown for adults over 65. In 1987, length of stay increased for all adults and for adults over age 65.

Table A–8. Change in Length of Stay, All Adults and Adults Over Age 65, 1980–1987 (In percent)

Year	All Adults Length of Stay	Percent Change	Adults Over 65 Length of Stay	Percent Change
1980	7.2	0.5	10.4	-0.1
1981	7.2	0.4	10.4	-0.1
1982	7.2	-0.8	10.1	-2.3
1983	7.0	-2.0	9.7	-4.5
1984	6.7	-5.1	8.9	-7.6
1985	6.5	-2.4	8.8	-2.0
1986	6.8	1.5	8.8	0.3
1987[a]	6.6	1.4	8.9	1.5
Average 1970–1979	7.4	-0.0	11.3	-1.9
Average 1980–1983	7.2	-0.4	10.2	-1.8
Average 1984–1987[a]	8.8	-1.2	8.9	-2.0

a Estimate based on January through September 1986 compared with January through September 1987.

SOURCE: American Hospital Association National Panel Survey.

Staffing Patterns—The numbers and types of employees working in the hospital industry continue to change. Total hospital full-time equivalents (FTEs) increased slightly in 1986 and continued to increase in 1987, after declining in 1984 and 1985. In contrast, the total number of inpatient FTEs continued to decline through 1987. On a per-admission basis, however, the number of inpatient FTEs increased slightly over the same four-year period (Table A-9). Nevertheless, the 0.5 percent average rate of increase in the post-PPS period (1984-1987) is far less than in the period immediately preceding PPS. Between 1980 and 1983, the ratio of inpatient FTEs to admissions grew, on average, approximately 2.7 percent per year.

Payment policies of third party payers increasingly contain incentives to reduce costs. This trend includes Medicare's PPS. These policies have resulted in a reduction in the inpatient work force, but the reduction has lagged behind significant reductions in admissions and average length of stay. This would suggest that there is a potential for future productivity gains as hospitals adjust to the reduced demand for inpatient services. On the other hand, the recent leveling off of length of stay

Table A–9. Percent Change in Hospital Employment 1980–1987

Year	Total Hospital FTEs	Inpatient FTEs	Inpatient FTEs Per Admission
1980	4.7	4.5	1.6
1981	5.4	5.1	4.3
1982	3.7	3.4	3.4
1983	1.4	0.8	1.4
1984	-2.3	-3.5	0.2
1985	-2.3	-4.3	0.6
1986	0.3	-1.4	0.7
1987[a]	0.7	-0.8	0.5
Average 1970–1979	4.2	2.2	1.5
Average 1980–1983	3.8	3.5	2.7
Average 1984–1987[a]	-0.9	-2.5	0.5

a Estimate based on January through September 1986 compared with January through September 1987.

SOURCE: American Hospital Association National Panel Survey.

and the slow-down in the rate of decline in admissions may indicate that this potential is diminishing. The growth in inpatient FTEs per admission may be attributable to an increase in the complexity or severity of the average case, thus requiring more personnel to provide care.

Labor Productivity Measures—The following section discusses trends in hospital labor productivity and intensity. The information is based on ProPAC staff analysis of data from individual hospital departments compiled by Health Economics Research (HER) under contract to the Commission.

Development of Estimates—The Commission has examined two basic levels of labor productivity associated with the two levels of the hospital product—intermediate and discharge productivity.

- Intermediate productivity is measured in terms of labor resources per unit of service. A hospital can reduce its costs and improve its intermediate productivity by reducing the number of resource inputs used to produce a given service. For example, a hospital's radiology department may be able to reduce the hours of labor used to produce an individual x-ray.

- Discharge productivity is measured in terms of labor resources per discharge. Discharge productivity is a function of both intermediate productivity and intensity. Intensity reflects the units of service (e.g., x-rays, days of care) provided per inpatient stay. A hospital might improve its production of individual services (intermediate productivity) but still experience an increase in intensity, resulting in an overall decline in discharge productivity.

HER developed measures of productivity based on hours per unit of service (intermediate productivity) and hours per discharge (discharge productivity). Decreases in productivity are represented as increases in hours per discharge or hours per unit of service. The measures are developed for individual hospital cost centers, for aggregate classes of cost centers, and for all hospital cost centers combined.

The measures are based on data from the AHA Monitrend Reports. For over 25 years, the AHA has generated a variety of these reports that permit subscribing hospitals to compare their costs and productivity by hospital cost center to other hospitals of comparable size. For this analysis, HER used the Six Month Summary Reports for the period ending June 30 for the years 1980-1987.

These reports never present individual statistics but present hospital median values by bedsize category. Because the data are not presented for the entire U.S., they need to be aggregated. To better generalize to the U.S., HER weighted the median values for individual bedsize categories by the proportion of discharges from U.S. hospitals in each of the categories. Resource inputs were defined as labor inputs, as measured by paid hours. Aggregate intermediate productivity, discharge productivity, and intensity measures were developed across all departments.

The AHA data are more precise in reporting units of service measures for some departments than for others. In the laboratory, for example, the unit of service is based on a workload unit; in physical therapy, services are defined in terms of treatments. When percent changes in intermediate productivity or intensity are aggregated across such disparate departments, the average trend estimates reflect a mixture of the trends in individual departments. To reduce the heterogeneity of these units of service, HER first calculated percent changes within departments, then aggregated across departments using the proportion of total expenses accounted for by that department. HER adjusted all measures to reflect inpatient hospital activity by using the AHA standard ratio of inpatient to outpatient revenues.

The Commission believes that these productivity measures suffer from a major flaw—the lack of an adjustment for changes in the hospital product.

The Commission was particularly concerned that the measures did not adjust for product changes associated with real case-mix increases. Because the Commission includes an explicit adjustment for real case-mix change in the update factor, measures of productivity need to be adjusted for this factor. Otherwise, the Commission may inadvertently adjust twice—once explicitly in the real case-mix change adjustment and once implicitly through a lower productivity offset than would be warranted. That is, the unadjusted productivity

measures might indicate less productivity gain (or more productivity decline) because they are not adjusted to account for the confounding effects of case-mix change on the hospital product.

To address this problem, HER adjusted both the discharge productivity and intensity measures for real case-mix change. The Commission assumed that real case-mix change would most directly affect intensity—the number of units of service provided to patients during an inpatient stay. These intensity changes, in turn, would affect the discharge productivity measures. The intermediate measures (services per paid hour) do not require adjustment because they are less susceptible to the impact of real case-mix change. For example, while changes in the types of patients treated have a substantial effect on the number of lab tests provided to patients, they are less likely to affect the number of lab tests produced per hour, the measure of intermediate productivity.

It should be noted that for some departments, the measure of a service unit can be affected by real case-mix change. For example, in medical and surgical departments, the only measure of service available is the patient day. Clearly, this measure would be affected by real case-mix change. That is, real case-mix change would affect both the number of patient days per discharge (intensity) and the number of hours required to care for patients each day (intermediate productivity). Yet, if both measures were adjusted for real case-mix change, we would double adjust the estimates. In the adjustment process, the Commission could have allocated a portion of the case-mix change to intensity and to intermediate productivity, but such an allocation would be arbitrary. In the end, the Commission found it simplest to use case-mix adjusted discharge productivity and intensity measures, and unadjusted intermediate productivity measures. This results in a consistent understatement of the intermediate productivity gains. However, to the extent that intermediate productivity improvement is underestimated, intensity decline is overestimated by our methodology.

The real case-mix change estimates are based on: (1) estimates for fiscal years 1985 and 1986 as reflected in the Commission's past update factor, and (2) revised estimates for fiscal year 1987 based on the most recent information available from HCFA.

Due to insufficient information, the figures for the 1980 to 1984 period had to be estimated based on the following assumptions: (1) real case-mix change between 1980 and 1983 followed an underlying change of 0.5 percent per year in the case-mix index (Ginsburg, P.B., and Carter, G.M., "Medicare Case Mix Index," *Health Care Financing Review*, Summer 1986.); (2) by 1984, hospitals were phasing into PPS and began to divert patients to non-inpatient settings, resulting in a slightly higher increase in real case-mix.

Study Results—Table A-10 and Figure 3 present the results from the Monitrend analyses. The data show a small improvement in discharge productivity (decrease in hours per discharge) in the first two years of PPS, with a return to productivity declines (increase in hours per discharge) in 1986 and 1987. In large part, the decline in discharge productivity in 1986 can be traced to increases in units of service provided per discharge.

Case-mix adjusted intensity declined during the first two years of PPS. This decline can be partly attributed to hospitals reducing services in response to PPS incentives and partly to hospitals shifting the locus of care from the inpatient to the outpatient setting. More specifically, however, the decrease can be largely attributed to declines in length of stay. This is because patient days were used as the unit of service for routine nursing care in the hospital patient care units. Reductions in ancillary services were also achieved during this period.

The intensity upturn observed in the case-mix adjusted Monitrend data in 1986 and 1987 may be explained by a variety of factors including less opportunity to shift services out of the hospital and less opportunity to reduce services not medically required by patients. The upturn may also represent lessened economic pressures on the hospitals to reduce services as significant positive operating margins were realized in the early years of PPS.

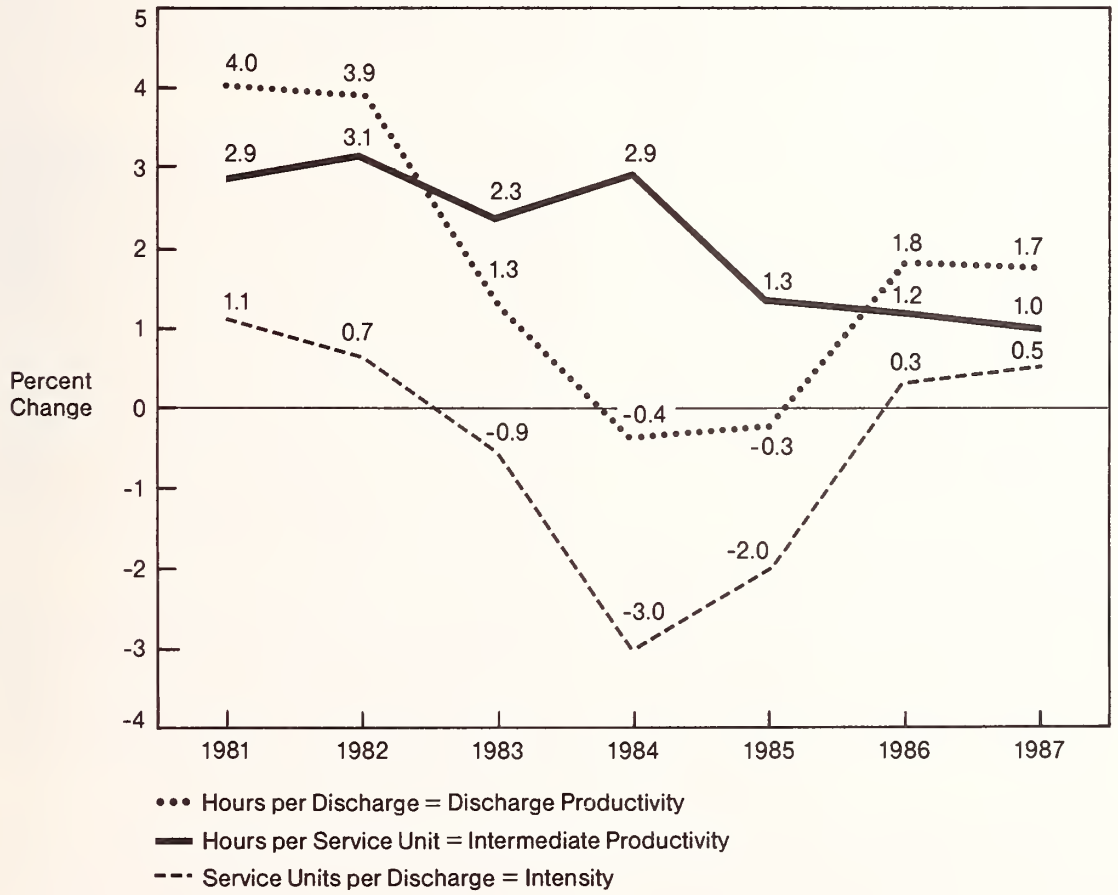
While intensity significantly decreased and then increased during the post-PPS period, hours per unit of service increased continually, but at a slightly slower rate since 1984. The rate of increase reached the lowest level in 1987—one percent.

Table A-10. Case-Mix Adjusted Trends in Discharge Productivity, Intermediate Productivity, and Intensity: Annual Percent Change 1981-1987

Year	Real Case-Mix Change	Discharge Productivity: Hours per Discharge	Discharge Productivity: Hours Per Discharge, Case-Mix Adjusted	Intermediate Productivity: Hours Per Service Unit	Intensity: Service Units Per Discharge	Intensity: Service Units Per Discharge, Case-Mix Adjusted
1981	0.5	4.5	4.0	2.9	1.6	1.1
1982	0.5	4.4	3.9	3.1	1.2	0.7
1983	0.5	1.8	1.3	2.3	-0.4	-0.9
1984	0.7	0.3	-0.4	2.9	-2.3	-3.0
1985	0.8	0.5	-0.3	1.3	-1.2	-2.0
1986	2.0	3.8	1.8	1.2	2.3	0.3
1987	1.3	3.0	1.7	1.0	1.8	0.5
Average 1981-1983	0.5	3.6	3.1	2.8	0.8	0.3
Average 1984-1987	1.2	1.9	0.7	1.6	0.2	-1.0

SOURCE: AHA Monitrend data analyzed by Health Economics Research, Inc. under ProPAC contract. Real case-mix change estimates by ProPAC.

Figure A-3. Annual Percent Change in Real Case-Mix Adjusted Productivity: 1981-1987



SOURCE: Health Economics Research, Inc. analysis of Monitrend Data under contract to ProPAC

Implications For The Discretionary Adjustment Factor—Overall, little initial improvement in labor productivity has been observed during the post-PPS period. Hours per discharge continue to increase. The annual rate of increase, however, is less than observed for the pre-PPS period: a 3.1 percent annual change in the 1981-1983 period compared to 0.7 percent since 1984. Moreover, the rate of decline in the productivity of individual services (hours per service unit) has slowed since 1984.

At the same time, there has been a reduction in the intensity of services provided per discharge in the post-PPS period. While intensity rates began to increase in 1986, the rate of increase remains lower than in the pre-PPS period. It may be that, at least during the first two years of PPS, hospitals placed more emphasis on cutting services rather than on producing each unit of service more efficiently.

The above trends need to be interpreted with caution since the data remain unadjusted for product changes related to factors other than real case-mix change. That is, the data are unadjusted for scientific and technological advancement and practice pattern changes, except for changes resulting in increased outpatient activity.

The problem of product change affects measures of productivity in all industries, but it is especially acute in the hospital industry where changes in medical practice historically have been relatively rapid and where measures of the hospital output or product (e.g., outcome, quality of care) are poorly defined. Nevertheless, the Commission believes the trends generally reflect the hospital industry during the period under study.

Based on its examination of these historical trends, the Commission has recommended a minus 0.5 percent productivity allowance in the fiscal year 1989 update factor for PPS hospitals. This allowance is associated with a target productivity gain of one percent, since the Commission's approach is that productivity gains should be shared roughly equally.

Site-Of-Care Substitution

In each of its reports to the Secretary, the Commission has included a negative adjustment for site-of-care substitution. This offset reflects the decrease in inpatient costs associated with reductions in inpatient resources used to care for patients admitted to the hospital. Resource reductions result from the provision of non-inpatient services to patients who formerly received such services during the inpatient stay. The offset does not include resource reductions for patients whose entire stay is diverted from the hospital to other settings.

The Commission believes that, without a payment adjustment, site substitution would have resulted in the Medicare program and the Medicare beneficiary overpaying for services in the period following the introduction of PPS. Overpayment potentially occurs because the cost of services no longer rendered in the inpatient unit remain in the cost base used to establish the DRG payment rates.

Medicare Program Expenditure Data—Ideally, analyses of site-of-care substitution would include examination of the services received by a patient throughout an episode of illness. Currently, however, there are no data that trace the costs of an episode of illness for Medicare patients.

Medicare program data do serve as one indicator of trends in site-of-care substitution. Tables A-11 and A-12 provide projections of Medicare program health care expenditures for patients hospitalized during the period 1985 through 1988. Medicare program data on a one percent sample of Medicare beneficiaries were available for two years—1980 and 1985. The 1985 data were extrapolated through 1988 based on the trends for all Medicare beneficiaries, irrespective of whether they were admitted to the hospital. The methodology basically assumes that Medicare expenditure trends for hospitalized beneficiaries are approximately equivalent to those for all Medicare beneficiaries.

Despite the growth in dollars spent for inpatient care, there has been a steady decline in the proportion of total Medicare expenditures for these services. At the same time, the proportion of Medicare expenditures for outpatient hospital, physician, and other services continues to grow.

The above results are highly dependent on expenditure trends for all Medicare patients, whether or not they have been hospitalized. These trends represent changes that are due to various factors.

Table A-11. Estimated Medicare Expenditures for Hospitalized Beneficiaries By Type of Provider 1985-1988 (in billions of dollars)

Calendar Year	Inpatient Hospital	Outpatient Hospital	Physician[a]	Skilled Nursing	Home Health[b]
1985	33.2	1.7	10.7	0.4	1.2
1986	34.5	2.0	12.1	0.4	1.4
1987	36.1	2.5	14.1	0.4	1.5
1988	37.9	3.1	16.0	0.5	1.7

a Physician dollars are Supplementary Medical Insurance Trust Fund (SMI) expenditures for physicians, radiology, pathology, independent laboratory, and group prepaid practice services, and supplies.

b Home health dollars are Hospital Insurance (HI) and SMI Trust Fund expenditures.

SOURCE: ProPAC estimate based on a one percent sample of Mecicare beneficiaries.

Table A-12. Estimated Percent Distribution of Medicare Expenditures for Hospitalized Beneficiaries by Type of Provider 1985-1988

Calendar Year	Inpatient Hospital	Outpatient Hospital	Physician[a]	Skilled Nursing	Home Health[b]
1985	70.3	3.6	22.7	0.8	2.5
1986	68.4	4.0	24.0	0.8	2.7
1987	66.1	4.6	25.8	0.8	2.8
1988	64.1	5.2	27.1	0.8	2.9

a Physician dollars are Supplementary Insurance Trust Fund (SMI) expenditures for physicians, radiology, pathology, independent laboratory, and group prepaid practice services, and supplies.

b Home health dollars are Hospital Insurance (HI) and SMI Trust Fund expenditures.

SOURCE: ProPAC estimate based on a one percent sample of Medicare beneficiaries.

For example, increases in the proportion of expenditures for out-of-hospital services include increased expenditures for patients never admitted to the hospital as well as expenditures for those admitted. While these data serve as a useful indicator of the existence of site substitution, they cannot be the sole basis of Commission judgments.

Length of Stay Trends—The Commission's judgments on site substitution have been heavily influenced by trends in length of stay. When length of stay rapidly declined in the post-PPS period, the Commission concluded that a portion of the reduction was associated with decreases in services. This conclusion was supported by intensity data from the Monitrend Survey which indicated significant reductions in intensity during the 1983-1985 period. By 1986, however, both length of stay and intensity showed slight increases. Intensity, adjusted for real case-mix change, grew 0.3 percent. According to the AHA Panel Survey, length of stay increased 0.3 percent for patients 65 years and older.

These increases continued between 1986 and 1987. Length of stay for patients age 65 and over increased 1.5 percent. Even after adjusting for real case-mix change, length of stay increased approximately 0.2 percent. Case-mix-adjusted intensity continued to increase 0.5 percent during the year.

Implications For The DAF—Based on its examination of the above data, the Commission recommends no offset to the standardized amounts to accommodate site-of-care substitution.

The amount of the adjustment for site substitution has significantly declined since the Commission first issued its reports—from a one percentage point reduction in the Commission's recommendation for the fiscal year 1986 update factor to a zero percent reduction for fiscal year 1989. The steady decrease in the adjustment reflects the Commission's belief that the potential for site-of-care substitution has diminished over time.

The Commission believes that changes in technology will continue to result in the diversion of entire admissions to other settings. This diversion will continue to be reflected in the Medicare expenditure data. The increases in expenditures for non-inpatient services, however, is not synonymous

with site-of-care substitution—the shift of services to non-inpatient settings for patients admitted to the hospital.

Given the increases in both case-mix adjusted length of stay and intensity, the Commission believes that the potential for a further site substitution will largely diminish by fiscal year 1989 unless there is a major change in technology or Medicare benefit structure. For example, if the nursing home supply and benefits significantly expand, patients may be discharged earlier to these settings.

DEVELOPMENT OF THE DISCRETIONARY ADJUSTMENT FACTOR FOR PPS-EXCLUDED HOSPITALS AND UNITS

Four types of facilities are excluded from PPS. These facilities—psychiatric, rehabilitation, long-term, and pediatric hospitals and distinct-part units—are paid on the basis of each facility's historic costs trended forward, with a limit placed on the rate of increase in per case reimbursable costs. These "target rate-of-increase" limits, established by the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA), must be updated each year. The update to the limits is analogous to the update factor for PPS hospitals.

The Commission's update factor recommendation for excluded facilities includes allowances for inflation and a correction for market basket forecast error. In addition, ProPAC includes allowances for scientific and technological advancement and productivity change. These two allowances comprise the DAF for excluded hospitals.

The Commission reaffirms its previous recommendations calling for the application of a single DAF to all excluded facilities. The Commission has not attempted to precisely quantify each allowance. Rather, it arrived at the summary judgment that the net of the two individual DAF allowances should be zero in the fiscal year 1989 update factor for excluded facilities.

Current Status of Excluded Hospitals and Units

Since the beginning of PPS, the number of excluded facilities has grown dramatically (Table A-13). Excluded facilities include entire hospitals devoted to the provision of certain services, or distinct-part units which provide these services in a larger hospital. In part, this growth does not reflect an actual increase in facilities but a change in payment status. That is, over time, hospitals that already were providing psychiatric, rehabilitation, children's or long-term services applied for official status as PPS-excluded facilities. In part, however, the growth also reflects the development of specialized hospital units and free-standing facilities in response to the incentives of PPS. The individual types of excluded facilities are discussed below.

Psychiatric Facilities—Psychiatric hospitals and distinct-part units primarily provide psychiatric treatment for mentally ill people. Some people

Table A–13. Growth in Excluded Hospitals and Units: Fiscal Years 1984–1987

	Number				Percent Change
Category	FY84	FY85	FY86	FY87	FY84–87
Hospitals					
Psych	439	481	515	576	31.2
Rehab	49	68	79	87	77.6
Long-Term	84	86	92	88	4.8
Children's	47	53	55	56	19.1
Total	619	688	741	807	30.4
Units					
Psych	722	733	906	969	34.2
Rehab	308	386	473	525	70.5
Total	1030	1119	1379	1494	45.0

SOURCE: The Health Care Financing Administration, Department of Health and Human Services.

with substance abuse problems are also treated in these facilities. In fiscal year 1987, 576 psychiatric hospitals qualified for exclusion from PPS. This is a 31.2 percent increase since fiscal year 1984. The number of psychiatric units increased 34.2 percent since fiscal year 1984, with 969 psychiatric units qualifying as excluded facilities in fiscal year 1987. Medicare inpatient payments are estimated to be approximately $4500 per case for patients treated in excluded psychiatric facilities during fiscal year 1988.

Rehabilitation Facilities—Rehabilitation hospitals and distinct-part units provide intensive treatment for people with certain conditions, usually after a period of acute medical or surgical care. According to Medicare's definition, to qualify as a rehabilitation facility, the facility must provide 75 percent of its patients' intensive rehabilitation services for one of the following ten conditions: (1) stroke; (2) dorsal, lumbar or cervical spinal cord injury with paraparesis/paraplegia or quadriparesis/quadriplegia; (3) congenital deformity; (4) amputation of the leg or lower limb; (5) major multiple trauma; (6) fracture of a femur; (7) head injury; (8) polyarthritis; (9) neurological disorders; and (10) burns.

In fiscal year 1987, 87 rehabilitation hospitals qualified for exclusion from PPS. This is an increase of 77.6 percent since fiscal year 1984. As of the end of fiscal year 1987, 525 rehabilitation units qualified for exclusion. This is an increase of 70.5 percent since 1984. Medicare inpatient payments are estimated to be approximately $8900 per case for patients treated in excluded rehabilitation facilities during fiscal year 1988.

Long-Term Hospitals—To qualify as a long-term hospital excluded from PPS, the hospital must have an average length of stay that exceeds 25 days. Many long-term hospitals resemble acute care hospitals with varying levels of intensity of services or resemble nursing homes. Most of these hospitals do not support operating rooms or emergency departments, but many have contractual agreements with nearby acute hospitals to provide additional needed services. In addition, numerous long-term hospitals specialize in rehabilitation, psychiatric, or pediatric services.

To better evaluate the hospitals included in HCFA's list of excluded long-term hospitals, ProPAC compared each hospital to the designation it applied to itself on the AHA 1985 Annual Survey. The results suggest the following distribution of long-term hospitals by hospital category: 33 percent chronic disease (including tuberculosis and other respiratory diseases); 19 percent rehabilitation; 17 percent psychiatric; six percent general, medical, and surgical; and four percent children's. The remainder are classified as various types of specialty hospitals or as specialized units within such places as prisons, college infirmaries, and homes for the mentally retarded. Because of the diversity of long-term hospitals, some of them may qualify as other types of excluded facilities.

Eighty-eight hospitals were qualified as PPS-excluded long-term hospitals at the end of fiscal year 1987. This represents a 4.3 percent decrease since the previous year, but a 4.8 percent increase since 1984. Medicare payments for inpatient services provided in long-term hospitals are estimated to be approximately $6400 per case in fiscal year 1988.

Children's Hospitals—To qualify for exclusion, a pediatric hospital must demonstrate that the majority of its patients are under age 18. Since the vast majority of Medicare beneficiaries are over age 18, very few are cared for in pediatric hospitals. As of the end of fiscal year 1987, the number of hospitals qualifying for this exemption totaled 56, an increase of 19.1 percent since fiscal year 1984.

Development of the Scientific and Technological Advancement Allowance

The scientific and technological advancement allowance is a future-oriented policy target. It reflects the Commission's judgment of the financial requirements for hospitals to implement cost-increasing but quality-enhancing technologies used to treat Medicare inpatients.

The policy target is ultimately based on judgment since it is impossible to enumerate all the technologies that meet this definition and to precisely define their costs for all categories of excluded hospitals. In order to develop a more informed judgment, however, the Commission applies the same approach as that used for PPS hospitals. It attempts to estimate the potential impact of

newly introduced devices or treatments on Medicare costs by examining a select group of technologies. ProPAC contracted with Project HOPE to identify and estimate the impact of these technologies and scientific advances on Medicare costs. The focus of this work has been on technologies in psychiatric, rehabilitation, and long-term facilities.

Developing the Estimates—Project HOPE employed basically the same approach to developing the estimates for all the excluded facilities, except long-term hospitals. A list of technologies for potential inclusion in the study was obtained by: reviewing the technologies studied last year; reviewing the recent medical literature as well as industry publications; and incorporating responses from professional societies that were consulted.

The list was reduced with the aid of expert consultants, and cost estimates were developed. The experts were asked to select technologies that met all of the following criteria:

- The estimated Medicare incremental cost impact of the technologies should be cost-increasing. The criterion does not include a specific dollar threshold because of the difficulty in establishing a single threshold across all types of excluded facilities.

- The technology should be at least five percent and not more than 75 percent diffused into the Medicare population. This criterion is to assure that the technology is beyond its research phase but not fully diffused.

- The technology should be considered safe and effective. Technologies should be FDA-approved and generally accepted in the medical community for inclusion in the allowance.

Cost estimates were derived for each technology category for the psychiatric and rehabilitation facilities. Information on costs and use was obtained from the medical literature, market surveys, and industry publications. Additional information came from consultations with clinicians and other consultants. The estimates include the following:

- Inpatient operating costs (specifically excluding capital costs);

- Incremental changes in the use of the technology in fiscal year 1989 compared to fiscal year 1988;

- Changes in costs per case relating to the use of the technology, not just the cost of the technology itself.

The above methodology proved unsatisfactory for long-term hospitals because of the diversity of facilities included in this category. For these facilities, a weighted average of the per case cost estimates for PPS, psychiatric, and rehabilitation facilities was used. The weights were based on the proportion of beds in long-term hospitals classified in the 1985 AHA Annual Survey as general medical/surgical (PPS-type beds), psychiatric, and rehabilitation beds.

Study Results—The methodology used in last year's study for the identification of new technologies resulted in the initial identification of 30 psychiatric and 93 rehabilitation technologies. Modification of the initial list reduced the number of new technologies to 16 psychiatric and 30 rehabilitation technologies.

Application of the same methodology this year resulted in the addition of one rehabilitation and two psychiatric technologies to the list of cost increasing technologies. Of the 18 psychiatric and 31 rehabilitation technologies initially considered, four psychiatric and five rehabilitation technologies were estimated to satisfy all three criteria. The incremental increase in Medicare average cost per case for these technologies was estimated to be 1.5 percent for psychiatric and between 0.07 and 0.10 percent for rehabilitation facilities. The estimate of the incremental Medicare per case cost increases for new technologies in long-term hospitals ranged from 0.42 to 0.47 percent (Tables A-14 and A-15).

The results suggest that the introduction of new technologies into the clinical setting does not change dramatically from year to year. However, the estimates of the incremental operating costs increased dramatically between fiscal year 1988 and fiscal year 1989 estimates.

Table A-14. Estimates of Incremental Impact of New Cost-Increasing Technologies in Psychiatric Hospitals and Distinct-Part Units

New Technology	Aggregate Cost Estimates (In Thousands of Dollars)
Geriatric Treatment Programs	$13003.6
Magnetic Resonance Imaging	1129.2
Medical/Psychiatric Units	1646.4
AIDS Infection Control	1598.9
Total Estimate of Cost-Increasing New Technologies in FY89	17378.1
Estimated Total Operating Cost Per Case in FY88	4498
Estimated Total Operating Cost Per Case in FY89	4566
Estimated Increase in Operating Costs per Case for Scientific and Technological Advances in FY89	1.5%

SOURCE: Project HOPE under contract to ProPAC.

In large part, the estimated increase in operating costs was due to implementing guidelines associated with the presence of patients with Acquired Immune Deficiency Syndrome (AIDS). For example, the need for more stringent infection control procedures associated with the presence of AIDS patients has resulted in greater use of hospital gloves, more expensive systems for disposing of needles, and other changes that increase the cost of hospital routine procedures. The costs associated with AIDS control are estimated to increase Medicare costs in psychiatric hospitals by roughly $1.5 million and in rehabilitation facilities by approximately $700,000 in fiscal year 1989.

Proliferation of medical/psychiatric units and geriatric treatment programs is also projected to greatly increase operating costs in fiscal year 1989. Almost $15 million of the $17 million for new technologies in psychiatric facilities is for these programs. The expansion of these programs is thought to reflect the changing demand and increasing complex case mix seen in psychiatric facilities. If these case-mix related programs are removed from the calculation of the total increase, then Medicare costs per case would increase only 0.2 percent to accommodate the remaining technologies in fiscal year 1989.

Rehabilitation facilities have experienced a less dramatic increase in the use of new technologies. The estimate of the increases in Medicare costs associated with the use of customized plastic orthotics remains essentially unchanged from the fiscal year 1988 estimates.

Costs associated with three of the five technologies could not be estimated. The study may not have captured some of the important costs associated with the treatment of rehabilitation patients, because it was designed to capture the cost-increasing impact of technologies that were adopted system-wide. This design requirement is particularly problematic for rehabilitation facilities where many new technologies are customized adaptations for a single or limited group of patients.

Table A-15. Estimates of Incremental Impact of New Cost-Increasing Technologies In Rehabilitation Hospitals and Distinct-Part Units

New Technology	Aggregate Cost Estimates (In Thousands of Dollars)
Augmentative Communication Devices	unable to estimate
Customized Plastic Orthotics	$25.8 - $322.5
Customized Positioning & Seating	unable to estimate
Neurodiagnostic Equipment	unable to estimate
AIDS Infection Control	$696.5
Total Estimate of Cost-Increasing New Technologies in FY89	$722.3 - $1019.0
Estimated Total Operating Cost Per Case in FY88	$8921
Estimated Total Operating Cost Per Case in FY89	$8927 - $8930
Estimated Increase in Operating Costs per Case for Scientific and Technological Advances in FY89	0.07% - 0.10%

Source: Project HOPE under contract to ProPAC.

Rehabilitation facilities also specialize in particular types of patients and treatments such as head and spinal injury. This specialization is not reflected in the estimate.

Study Implications—The above estimates are subject to several general limitations. First, the estimates do not capture the cost impact of more established technologies that are still diffusing into hospitals, or those that have different applications than originally intended. Second, as noted above, the estimates reflect only technologies adopted system-wide. Third, the cost estimates are affected by uncertainty regarding future adoption and use of specific new technologies for Medicare patients. Moreover, estimating the extent to which new technologies substitute for existing ones is difficult.

While subject to limitations, the estimates provide a reasonable starting point upon which the Commission can make a judgment. Together, the scientific and technological advances studied would increase average Medicare operating costs per case approximately one percent in fiscal year 1989. If, however, the estimate is based solely on the emergence of new technologies and excludes the case-mix related increases in psychiatric facilities, then the increase would be only approximately 0.2 percent. These estimates are based on weighted averages of the per-case increases for psychiatric, rehabilitation, and long-term facilities. The weights are the discharges from each type of facility in fiscal year 1986, the last year for which discharge data are currently available.

Based on its analyses, the Commission concluded that it is reasonable to incorporate the PPS allowance of 0.5 percent for scientific and technological advancement in the update factor for excluded facilities. Until more specific measures of case-mix change are developed for these facilities, the Commission believes the scientific and technological advancement allowance should at least partially accommodate treatment modality changes in response to changing case mix. Therefore, the Commission set the allowance slightly higher than if it had been based solely on the emergence of new technologies.

Productivity and Efficiency Potential

The productivity allowance is a future-oriented target that reflects potential changes in both efficiency and productivity resulting from implementation of target rate of increase limits.

Health Economics Research, Inc. Study--A study was performed by Health Economics Research, Inc. (HER) under contract to ProPAC to develop labor productivity measures for excluded facilities. Productivity trends for the period 1980-1986 were examined using data from the AHA Annual Survey. The data included all hospitals classified in the survey as psychiatric, rehabilitation, long-term general, and chronic disease hospitals. Data on short-term general hospitals were used to compare the excluded facilities to "PPS-type" hospitals. The data were for all patients, not only Medicare patients. In addition, the data were not limited to hospitals that received an exclusion under Medicare regulations.

Labor productivity trends were measured by comparing the growth in admissions, adjusted for outpatient activity, to the growth in labor inputs. Labor inputs were measured by the number of full-time equivalent employees recorded on the survey, adjusted for changes in employee skill mix.

Study Results—For all three classes of excluded hospitals, labor productivity has shown continued improvement in the post-PPS period. This compares to a decline found for PPS-type hospitals. Table A-16 compares the labor productivity trends for the excluded facilities in the pre- and post-PPS periods.

Study Implications—Based on the above data, the Commission could have decided that a greater productivity offset was warranted for excluded compared to PPS facilities because they have experienced greater productivity improvement. The Commission concluded, however, that such a judgment needs to be tempered by a recognition of the HER study limitations and the structure of Medicare payments to excluded hospitals.

First, the AHA data include psychiatric, rehabilitation, and chronic disease hospitals that have not received an exclusion from PPS. Second, the data do not reflect the experience of distinct-part units. Third, wide annual fluctuations in the excluded facilities' admissions limit any strong conclusions concerning productivity trends.

Table A-16. A Comparison of Pre-PPS and Post-PPS Labor Productivity[a] Trends in Psychiatric, Rehabilitation, and Long-Term Hospitals Compared to PPS-Type Hospitals (Percent Change)

	Facility Type			
Year	Psychiatric	Rehabilitation	Long-Term	PPS-Type
1980-1983	15.5	7.5	1.3	-4.8
1983-1986	2.8	4.8	21.9	-3.7

a Labor Productivity = Outpatient Adjusted Admissions/Skill-Mix Adjusted FTEs

SOURCE: Health Economics Research, Inc. under Contract to ProPAC. Analyses based on AHA Annual Survey Data, 1980-1986.

Finally, Medicare's method of paying excluded facilities is not the averaging system of PPS. Excluded facilities are paid on a hospital-specific, cost-reimbursement basis. The payment method does not account for case-mix change over time, except through an exceptions process. Certain hospitals which previously reduced their costs and have lower rates, might have fewer opportunities to reduce costs further. Thus, while the excluded hospitals appear to have achieved greater average productivity gains than PPS hospitals, the potential may be more limited for certain hospitals.

Given these considerations, the Commission concluded that the productivity target for both excluded and PPS hospitals should be equally stringent.

PAYMENT FOR CAPITAL UNDER PPS

In its April 1987 report, the Commission reaffirmed its recommendation that capital and operating cost components should be combined into a single payment rate. In OBRA 1987, however, Congress mandated that capital payments continue on a cost basis until fiscal year 1992. The Commission, therefore, is reaffirming its recommendation for an institutional neutrality adjustment to capital payments. This adjustment would reduce the negative incentives inherent in the dual capital-operating cost payment system.

Capital Payment Incentives

Currently, a hospital has incentives to inappropriately substitute capital for operating resources. This is because Medicare operating costs are paid through a fixed prospectively-set amount, while capital costs are reimbursed on a cost basis. Increases in capital costs, therefore, are reimbursed while increases in operating costs must be recouped from the fixed PPS payment.

A hospital thus has distorted incentives when faced with the decision to purchase a service from another provider, such as a CAT scan, or to invest in the capital equipment and provide the scan in-house. If the hospital purchases the service, it receives a bill for the service from the other provider. This bill covers both the capital and operating costs of providing the scan. Under Medicare cost reporting methods, however, the total bill is classified as an operating cost and is recovered under the DRG payment amount. Thus, the hospital receives no additional payment resulting from the purchase of the service from another provider.

If the hospital provides the scan in-house, only the operating costs associated with providing the service are recovered under the DRG payment amount. Medicare's share of the capital costs, however, is paid separately in the pass-through payment. The hospital may maximize its Medicare reimbursement by providing CAT scans in-house. This is true even though it may be less expensive in terms of total resources consumed to purchase scans from outside suppliers. While there are other factors that influence a hospital's decision to purchase or provide services in-house, Medicare payment policy introduces a distorted incentive.

The Secretary asserts that the capital costs of services purchased from other providers already are incorporated in the standardized amounts. The 1981 cost data used to set the standardized amounts included the capital costs of purchased services. Thus, hospitals may already be compensated for these costs. This is not relevant, however, to a discussion of the incentives now facing an individual hospital under PPS.

There are several factors that may lessen the impact of this incentive to provide all services in-house regardless of total costs. Capital costs are paid on a reduced-cost basis, so a hospital can not recover its full Medicare capital costs. Capital expenditures can result in increased operating costs, so a hospital may choose not to make the expenditure because of its effect on operating costs. Finally, other payers may provide incentives related to offering services in-house that conflict with Medicare payment incentives.

On the other hand, a hospital may try to attract physicians or increase its market share by providing particular services in-house. Also, a hospital's ability to finance capital expenditures will affect its capital investment decisions.

ProPAC decided it would be worthwhile to identify potential methods for implementing the institutional neutrality adjustment. The options summarized below are from a document completed by SysteMetrics/McGraw-Hill, Inc. for ProPAC ("Institutional Neutrality of Capital Payments," ProPAC Contract Numbers T-47540316 and T-47539327, Washington, D.C., January 1988). These options have not been evaluated by the Commission. They are presented to demonstrate the range of methods for making the institutional neutrality adjustment.

Options for the Institutional Neutrality Adjustment

Regardless of the method used to implement the institutional neutrality adjustment, the Commission believes that the adjustment should reflect the Congressionally-mandated reductions to cost-based capital payments. These are costs minus 12 percent after January 1, 1988 and costs minus 15 percent in fiscal year 1989.

The best solution to the institutional neutrality problem is to pay for capital prospectively. This would eliminate the distortions in the current dual payment system. It also would provide incentives for hospitals to choose the most cost-effective means of providing services.

Short of this, capital payments should recognize that some fraction of each bill from institutions that provide services to hospitals is for capital. If this fraction of the bill were treated as a capital pass-through, then Medicare capital payment would be neutral to site-of-service delivery. All of the options presented below involve paying hospitals for some fraction of the costs from an outside supplier to the hospital. The options differ only in the way that this fraction is determined. They are arrayed from low reporting burden, low accuracy methods to high reporting burden, high accuracy methods.

Each option is presented as a percentage adjustment to the pass-through payment. Alternatively, the options could be computed as a dollar adjustment. The percentage approach, however, eliminates the need to reflect inflation or changes to other payment adjustments (e.g., wage rates, teaching status) incorporated in PPS. Each option could apply to all services purchased from an outside provider or only to particular services. For example, Medicare could provide the adjustment only for specific services that are likely to be purchased, cost effective to share, or diffused since the introduction of PPS. Finally, the adjustments could be automatic, made only when requested by a hospital, or made when a hospital passes a threshold of purchased services. An automatic adjustment would be less burdensome for hospitals who buy few services from outside suppliers.

Option 1: Hospital Average Ratio—The adjustment could be based on the hospital capital to total cost ratio applied to the suppliers' charges for services to Medicare beneficiaries. The hospital would include this fraction of the outside supplier's charges in its capital pass-through calculation. The capital to total cost ratio could be hospital-specific or based on the overall average ratio across hospitals.

This is a simple approach to setting the level. The additional burden for hospitals would be minimal because they already must file a cost report to receive the pass-through capital payment. They would have to accumulate their bills from outside suppliers and report them separately on the cost report. Outside suppliers would bill the hospital as before and would face no additional reporting burden. The burden for the Medicare program would be small because it already must collect and audit the cost reports and data to calculate the capital to total cost ratio are readily available.

The hospital-specific version may encourage hospitals to increase their capital to total cost ratio. This is not different, however, than the incentive faced by hospitals under the current policy. The ratios applied to the bills may not produce an accurate level of capital costs. The difference between a hospital capital to total cost ratio and the suppliers' true proportion of capital costs, however, is likely to be small.

There is potential benefit of applying a hospital average ratio. This benefit relates to the fact that suppliers compete and would have financial incentives to control their total cost for the service. Their prices to hospitals might therefore be lowered. Medicare would benefit from the lower cost if it is able to capture some of the resultant efficiencies through lower DRG rates.

Option 2: Supplier Average Ratio—The adjustment could be based on the supplier capital to total cost ratio applied to the suppliers' charges for services to Medicare beneficiaries. The average ratio, based perhaps on a survey, would be applied to all purchased services.

This option is very similar to the first option except that the percent adjustment is calculated based on suppliers' costs. The financial incentives under this option are similar to those for the first option. Hospitals, however, would not be able to increase the adjustment by spending more for capital.

Computing the supplier average ratio could be difficult because hospital suppliers are not subject to the same reporting requirements as hospitals. They would need to be surveyed to determine the ratio of capital to total costs.

Option 3: Service-Line Average Ratio—This option would be based on the capital to total cost ratio of producing specific services, applied to suppliers' charges. Categories of services covered by the adjustment would be defined (e.g., lithotripsy, laboratory services). A survey to determine the appropriate ratio adjustment would be required for every category. This option would allow hospitals to more accurately compare internal and external operating costs for the service in question.

The accuracy of the ratio adjustment could be increased by expanding the categories of services and, therefore, adding to the number of surveys. The effort of more surveys would be worthwhile only if the capital cost portions differed significantly across the categories.

Option 4: Supplier-Specific Ratio—This option requires each supplier to divide their bills into capital and operating cost portions. The hospital would use this information to compute its pass-through amount for outside suppliers and add this to its other capital costs. The capital and operating portions on the bill would be auditable for the hospital. This is a relatively accurate approach to obtain the pass-through amount. However, it would add a reporting burden for the outside supplier.

Payments under this option would be subject to manipulation because hospitals would prefer suppliers with low operating costs, without consideration of their capital costs. Any manipulation could be reduced if the suppliers' bills were subject to audit by Medicare. This, however, would add significantly to Medicare's auditing efforts.

Option 5: Specific Adjustment by Technology, by DRG—This option would increase a hospital's DRG payment when a Medicare inpatient receives a specific service or services provided by an outside supplier. The adjustment would be for the capital costs of the purchased service or services and would not be available to hospitals that provide this service internally. The payment could be determined by any of the above methods or it could be based on a standard deemed to be efficient. This option targets payments to specific DRGs or technologies.

RURAL HOSPITALS

The Commission has routinely included analyses of rural hospitals in its review of various PPS policies. Of special interest, however, has been the impact of PPS on isolated rural hospitals.

In the legislation creating PPS, the Congress attempted to ensure against undue financial risk for isolated hospitals by including special payment provisions for Sole Community Hospitals (SCH). The Congress included these provisions to help preserve hospitals where closure could threaten access to care in isolated areas.

It is difficult to know, however, which hospitals serve isolated populations. SCH designation does not provide adequate identification of all the hospitals serving these populations. Moreover, because some hospitals were grandfathered into the system, it is not clear what fraction of SCH-designated hospitals would meet the current SCH criteria. Therefore, the first step in any evaluation of Medicare's SCH policies is to define the set of hospitals that serve isolated populations. Under contract to the Commission, SysteMetrics/McGraw-Hill, Inc. (SysteMetrics) developed information to assist in the evaluation of the SCH criteria.

This section is divided into two major subsections. The first includes a summary of the current HCFA criteria for designating SCHs, followed by a review of preliminary results from the first phase of the SysteMetrics study. The second reviews preliminary information on the financial status of SCHs during the first three years of PPS.

Sole Community Hospital Criteria

Current Criteria—The protection for SCHs predates PPS. It was established at the time routine per-diem cost limits were imposed under Section 223 of the 1972 Social Security Amendments. The provision was adopted to protect access for Medicare beneficiaries.

The concern for beneficiary access also underlies continuation of the SCH exception under PPS. In this case, the concern relates to the impact of hospital insolvency on Medicare beneficiary access to care. Hospitals that become insolvent cannot continue to provide care to anyone. In isolated areas with single hospital providers, hospital closures would likely force area residents to travel long distances to receive care. While this might not be unduly burdensome for the general population, it could create a significant barrier to care for Medicare beneficiaries.

HCFA has specified that to qualify as a SCH under PPS, a hospital must meet one of the following conditions:

- It must be located more than 50 miles from a similar hospital.
- It must be located between 25 and 50 miles from a similar hospital and meet one of the following criteria:
  - —The hospital must be the exclusive provider to at least 75 percent of the service population, or to at least 75 percent of the Medicare beneficiaries in its area, or
  - —The hospital must have fewer than 50 beds and the Peer Review Organization or intermediary must certify that the hospital failed to meet the exclusive provider criterion because specialty services were unavailable, forcing beneficiaries to seek care outside the area, or
  - —The hospital must be isolated from similar hospitals for at least one month a year due to local topography or prolonged periods of severe weather.
- It must be located between 15 and 25 miles from a similar hospital and be isolated for at least one month a year due to local topography or weather conditions.

There were 361 SCHs listed by HCFA as of June 1987. While a very small number of these hospitals are urban, the vast majority are small, rural facilities. These hospitals' payments are based on a blend of 75 percent hospital-specific and 25 percent national rates.

Some rural hospitals that qualify for SCH status do not apply for it. Therefore, the number that would qualify for SCH status is unknown. For hospitals whose historical per-case costs trended forward are higher than the national rural payment rates, the SCH designation affords an advantage. All rural hospitals that qualify for SCH status do not, however, apply for it. For these hospitals, the financial advantages of a 100 percent national PPS rate may outweigh the limited financial protection afforded by SCH status. In fact, according to HCFA staff, approximately 35 SCHs have given up their SCH status since the beginning of PPS. Moreover, as noted earlier, not all designated SCHs

would necessarily meet the current criteria for SCH status. All of the original SCHs were grandfathered into SCH status when PPS was implemented.

SysteMetrics Study—This study examined the number and distribution of rural hospitals that are potentially eligible for designation as SCHs under Medicare's prospective payment system. The study had two objectives: (1) to identify all non-metropolitan hospitals that could be defined as meeting the current Medicare SCH criteria regardless of whether they have actually applied, and (2) to review alternative criteria for defining isolated rural hospitals.

In the first phase of the study, SysteMetrics attempted to identify all rural facilities eligible for SCH designation, whether or not they have actually applied. Using national data bases, the study attempted to translate HCFA criteria into measurable standards, enumerate hospitals that meet the criteria, and compare the characteristics of SCH eligible hospitals to those currently designated. The study was limited to hospitals within the continental U.S. The results reported here are preliminary.

Methods—Local data are required to interpret most of the HCFA criteria for SCH designation (e.g., impaired access due to severe weather conditions). Eligibility determination has, therefore, always been a decentralized, regionally administered process. Identification of hospitals which could be eligible for SCH status, therefore, involves simulating a regional determination process using nationally available data. Clearly, any simulation cannot replicate precisely the results of a case-by-case regional evaluation procedure.

SysteMetrics used the following methods to identify hospitals that met each of the three basic eligibility criteria—distance, market share, and weather and local topography.

- Universe of Hospitals—The universe of hospitals consisted of all non-Metropolitan Statistical Area (MSA), non-federal, short-term, general hospitals within the continental United States that were included in the 1984 American Hospital Association's Annual Survey. MSA definitions were used as of 1983.

- Distance—Highway mileage distances to neighboring facilities were measured using 1987 American Automobile Association highway maps.

- Hospital Market Shares—Hospital market shares were based on 1985 Medicare discharge patterns by patient zip code.

- Hospital Market Areas—The PPS regulations clearly indicate a 75 percent market share standard for hospitals between 25 and 50 miles from the nearest hospital. What is left unclear, however, is the definition of a hospital's local "market." For the purposes of this study, each hospital's market area was defined to include zip codes accounting for the top 60 percent of the hospital's Medicare discharges.

- Weather—The primary reason for this criterion is to account for road closures due to severe winter weather. As a first approximation of severe weather conditions, SysteMetrics used data from the National Oceanographic and Atmospheric Administration to estimate the maximum monthly snowfall for hospitals between 15 and 50 miles from the nearest hospital. The maximum monthly snowfall was based on the average figures for each month calculated over a 20 year period for each weather station in the U.S. Maximum snowfall for each hospital was estimated based on the location of the weather station closest to the hospital. Hospitals were identified as isolated if they experienced 20 or more inches of snow during their maximum snowfall month.

- Local Topography—SysteMetrics included the three rural hospitals on islands and the one hospital requiring ferry service for access in its list of SCH-eligible hospitals.

- Travel Time—Since travel-time surveys do not exist for most areas of the nation, SysteMetrics attempted to approximate travel time by coding the mileage between hospital locations by road type and terrain, and applying average travel speed coefficients. American Automobile Association detailed state maps were used wherein road quality is determined by actual

driving survey teams. The topographic shading of the maps was used to indicate mountainous terrain.

In order to estimate average highway speed, including slower journeys through congested towns, SysteMetrics used the average ratio of road miles to travel time for a sample of 157 trips drawn from all regions in the U.S. The data were again drawn from the American Automobile Association driving surveys. Thirty-three individual driving coefficients (minutes/mile) were developed. These coefficients reflected different regions of the country, road types, and terrain.

Preliminary Results—Table A-17 lists the simulated number of hospitals eligible for SCH designation under each criterion. If the HCFA criteria were applied nationally, using the standards developed by SysteMetrics, there would be 211 hospitals eligible for SCH designation within the continental United States.

Nationally, most rural hospitals are conspicuously close to an alternative facility. Only 86 hospitals were found to be more than 50 road miles from the nearest hospital.

There is substantial variation in the number of SCH-eligible hospitals. SCH-eligible hospitals are primarily located in the upper midwest and the mountain regions.

Regionally, the lack of SCH providers in southern states is most striking. In part, the lack of eligible facilities in this region may be attributable to study design limitations that are discussed below. In part, however, hospitals in the rural south are not that far from one another and are not isolated by virtue of sustained, extreme weather conditions.

Table A–17. Hospitals Eligible for Sole Community Hospital (SCH) Designation by Identifying Criteria

Criteria	Number	Percent
1. Weather/Topography Only	75	35.5
2. Distance Only	77	36.5
3. Market Share Only	45	21.3
4. Weather and Distance Jointly	4	1.9
5. Weather and Market Share Jointly	5	2.4
6. Distance and Market Share Jointly	4	1.9
7. All Three Criteria	1	0.5
Total Identified	211	100.0

SOURCE: SysteMetrics under contract to ProPAC.

The SCH criteria do not significantly overlap in any region. Weather is the crucial criterion for the northeast, market share is a key factor in the upper midwest, and extreme distance or isolation (greater than 50 miles to nearest hospital) is the most important criterion in the mountain states.

Table A-18 compares the number of facilities currently designated as SCHs with the number that would be eligible under current HCFA criteria. The number of eligible hospitals (211 hsopitals) is significantly less than the number actually designated in the continental United States (308 hospitals). Moreover, in most regions, the distribution of SCH-eligible hospitals varies significantly from those currently designated. However, many SCH-eligible hospitals are not currently SCH-designated (119 hospitals).

The estimate of SCH-eligible hospitals is highly sensitive to the specification of the market share criterion and the definition of market area. The more narrowly defined the market area, the more likely a hospital can achieve a dominant market share (e.g., 75 percent). Concomitantly, the lower the percentage required to meet the market share standard, the more likely a hospital will be able to meet the standard.

Table A-19 shows the number of rural hospitals in the continental U.S. that meet different standards for market area and market share. Small changes in these criteria would qualify hundreds of additional facilities for SCH designation. Since the market share criterion also requires hospitals to be at least 25 miles from the nearest neighbor, the total number of SCH eligible hospitals will be less than indicated in the table.

Moreover, most hospitals isolated by significant distances do not meet HCFA's 75 percent market share criterion, assuming a 60 percent market area definition. That is, only six percent of hospitals more than 50 miles from a neighbor had a market share greater than 75 percent. Less than ten percent

Table A–18. Distribution of Rural Hospitals by Sole Community Hospital (SCH) Status

Region	SCH Eligibles		Current SCH		Eligible, Current SCH	Eligible, Not Current SCH	All Rural Hospitals
	Number	Percent	Number	Percent	Number	Number	Number
New England	29	13.2	22	7.1	14	15	85
Mid Atlantic	17	7.3	1	0.3	--	17	106
South Atlantic	9	3.6	19	6.2	2	7	361
East North Central	31	15.5	13	4.2	5	26	365
East South Central	3	1.8	11	3.6	1	2	329
West North Central	19	10.0	60	19.5	12	7	598
West South Central	10	5.0	24	7.8	3	7	459
Mountain	71	33.6	110	35.7	43	28	260
Pacific	22	10.0	48	15.6	12	10	147
Total	211	100.0	308	100.0	92	119	2710

SOURCE: SysteMetrics under Contract to ProPAC.

of the hospitals isolated between 25 and 50 miles enjoyed this dominant market share.

The results of the travel-time analyses are shown in Table A-20. The table illustrates the regional differences in the average distance, travel speed, and estimated travel time to the closest neighbor for non-metropolitan hospitals. The estimates pertain to the 700 of the 2,710 rural hospitals that are more than 25 road miles from their nearest neighbor.

The lowest average travel speeds occurred on the East Coast and the highest in the South, including Texas and Oklahoma. Outside of the East Coast, however, little significant variation in travel speed occurs.

The primary effect of replacing distance with travel times is to better indicate the relative isolation of hospitals in New England and the Mid Atlantic regions. For example, whereas the mean travel distance in New England was seven miles less than in the Western Mountain states, average travel time is almost identical. Nationwide, the average time for hospitals isolated by more than 25 miles is almost 45 minutes—well over the standards often used for planning access to primary hospital services.

Table A-21 shows the relationship between distance and travel times for hospitals more than 15 miles to the nearest neighbor. If a time standard

Table A–19. Number of Rural Hospitals Meeting Different Definitions of Market Area and Market Share[a]

Market Share	Market Area Definition[b]		
	Narrow	Medium	Wide
50+ percent	1706	1581	1234
60+ percent	1053	910	583
70+ percent	410	320	158
75+ percent	195	142	55

a Distributions based on analysis of 2683 of 2710 nonmetropolitan community hospitals. Market share unavailable for 27 facilities.

b Market Area Definitions:
Narrow: Zip codes accounting for top 50 percent of Medicare discharges
Medium: Zip codes accounting for top 60 percent Medicare discharges
Wide: Zip codes accounting for top 75 percent of Medicare discharges

SOURCE: SysteMetrics under contract to ProPAC.

Table A–20. Travel Time and Distance for Hospitals More Than Twenty–Five Miles From Nearest Neighbor[a]

Region	Mean Distance (miles)	Mean Travel Speed (mph)	Mean Time (minutes)
New England	37.9	41.6	54.7
Mid Atlantic	29.7	41.9	42.5
South Atlantic	32.1	42.9	44.9
East North Central	32.5	47.7	40.9
West North Central	29.7	49.0	36.4
East South Central	32.3	52.0	37.3
West South Central	31.6	51.0	37.2
Mountain	45.0	48.5	55.7
Pacific	44.2	46.8	56.7
National Average	35.9	48.4	44.5

a Estimated for the 700 hospitals more than 25 road miles from nearest neighbor.

SOURCE: SysteMetrics under contract to ProPAC.

Table A-21. Distribution of Hospitals by Travel Time and Distance[a]

Travel Time to Nearest Neighbor (minutes)	Road Miles to Nearest Neighbor: Less than 50 miles	Road Miles to Nearest Neighbor: 50 miles or more	Total
Less than 30	848	--	848
30-39	402	--	402
40-44	90	--	90
45-49	52	--	52
50-54	42	3	45
55-59	29	2	31
60-89	23	64	87
90 or more	--	17	17
Total	1486	85	1572

a Excludes three hospitals on islands. Calculated for facilities more than 15 linear miles from the nearest neighbor.

SOURCE: SysteMetrics under contract to ProPAC.

were substituted for a distance standard, the effect on SCH eligibility would depend on where the time standard is set. Of those hospitals 50 miles or less from their nearest neighbor and thus ineligible under the current mileage criterion alone, 146 were estimated to be more than 45 minutes from the nearest hospital. If the standard were lowered to 40 minutes, an additional 90 hospitals would be included.

Study Implications—There appears to be a mismatch between the set of hospitals that would meet current criteria and those that are currently designated. In part, the discrepancy can be attributed to the large number of rural SCHs that were grandfathered into the system. These hospitals were designated as SCHs by regional HCFA offices at a time when uniform criteria did not exist.

In part, the discrepancy can also be attributed to problems with measuring some of the eligibility parameters. The substitution of national proxy measures for locally available data is likely to result in less accurate measurement of some parameters. For example, a number of errors could have been introduced in the measurement of distance. SysteMetrics used road miles to calculate distances, but these measures do not fully account for the circuity of roads. Moreover, they based the measures on paved road mileage, whereas the existence of gravel roads may cut the distances recorded. Perhaps more significant, hospitals were assumed to be in the center of the towns in which they were located, and distances between hospitals were calculated accordingly.

Estimation of isolation due to weather is, at best, imprecise. Snowfall is only a proxy for road closure conditions. Errors in the calculation of snowfall are also possible. In addition, there is a "valley bias" in all the snowfall data since snowfalls are recorded in settled areas and do not reflect the higher snowfalls in mountain passes.

While the above measurement problems exist, a larger source of the discrepancy may lie in the lack of uniform measurable standards to implement certain of the current criteria. Perhaps the most significant source of bias is the determination of hospital market share.

As noted in the earlier section on methods, there are no standards for defining hospital market areas. Hospitals and regional administrators are left free to use Medicare discharges only, all patient discharges, pre-existing planning areas, or other relevant geographic specification of the market area. This obviously introduces a lack of uniformity in the standards for determining SCH eligibility.

The issue is complicated by the fact that smaller hospitals, offering fewer services, may be unable to dominate the market due to patients seeking services out of the market area. Current regulations attempt to recognize this potential by allowing hospitals with fewer than 50 beds to adjust their market share calculation for out-migration. The local Peer Review Organization or fiscal intermediary must certify that the hospital meets the criterion based on the services available but fails because specialty services are not available. This provision can effectively lower the market share criterion significantly, depending on interpretation.

Only Medicare patient origin data were available for the SysteMetrics simulation. They were not available by specialty service. Because of these data limitations, the simulation may have underestimated the number of hospitals eligible for SCH designation based on total discharges or based on an adjustment for out-migration. On the other hand, the simulation applied the criteria more uniformly than probably occurs in practice. This uniformity might also be a source of error in the

estimates of hospitals actually eligible for SCH status under current procedures. The simulation, however, does provide a mechanism for assessing the potential impact on the number of SCH facilities if current HCFA criteria were uniformly interpreted.

In conclusion, the SysteMetrics preliminary results demonstrate the stringency and ambiguity of current SCH criteria. In particular, they show the ambiguity surrounding the market share criterion. Based on the simulation results, the 75 percent market share criterion seems particularly stringent.

The apparent stringency of the criterion, however, might be tempered slightly by the allowance for an exception based on patients seeking specialized services elsewhere. Nevertheless, this exception is extremely narrow. Most hospitals would find it difficult to justify the exception because regional patient origin data by hospital service are nonexistent in most parts of the nation.

Moreover, given the lack of guidelines for determining market area, the stringency of the market share standard may be felt more strongly in some regions than in other regions of the nation.

Finally, the study suggests the feasibility of measuring geographic isolation based on travel time rather than distance. To mandate travel time standards would require development of valid national driving time data.

Sole Community Hospital Financial Status

Ultimately, the Commission hopes to evaluate the impact of Medicare policies on the financial status of on isolated rural hospitals. Clearly, the design of this evaluation is heavily dependent on the definition of isolated rural hospitals. Examining the effect of Medicare PPS payment policies on currently designated SCHs begins this evaluation process.

Current Payment Policies—Current legislation grants the Secretary the authority to provide designated SCHs with three basic protections against financial insolvency. First, payment is based on a combination of 75 percent hospital-specific and 25 percent regional average rates. Second, SCHs are exempt from capital payment cuts. Third, SCH payment is adjusted for a decline in discharges of more than five percent over the preceding cost period, if the decline is due to factors beyond the hospital's control. The OBRA 1987 expands the latter provision to allow hospitals that qualify as SCHs to apply for the volume adjustment, whether or not the hospital is actually a SCH designated hospital.

Financial Status of Sole Community Hospitals—The financial status of hospitals can be evaluated in a variety of ways. For the purposes of evaluating PPS policies, however, the Commission has chosen to focus on data related to Medicare operating costs and PPS operating revenue margins during the first three years of PPS. PPS margins measure the difference between PPS payments and Medicare allowable operating costs, expressed as a percent of PPS payments. Preliminary estimates are presented below. The data are from a matched group of Medicare Cost Reports from the first three years of PPS. This cohort contains approximately 2200 hospitals from all areas of the nation except Maryland, Massachusetts, New Jersey, and New York.

PPS Operating Margins Per Case—Despite the special provisions in PPS that were designed to protect SCHs, over half of these hospitals experienced a PPS deficit by their third year under the program (Table A-22). Moreover, ten percent experienced deficits greater than 37 percent. With the exception of rural hospitals with less than 50 beds, no other group of hospitals studied showed such overall poor financial performance. At the same time, ten percent of the SCHs experienced positive margins higher than 15 percent in the third year of PPS.

Medicare Costs and Volume—SCHs have significantly higher Medicare operating costs per case than other rural hospitals, including those with less than 50 beds. Despite these higher costs, SCHs achieved cost reductions in the second year of PPS and minimal increases in the third year. On average, SCH Medicare operating costs declined 0.4 percent per year during the first three years of PPS. Reductions in volume, however, increased the average cost per case in these facilities. Nevertheless, the per case cost increases were less than for any other group studied. Thus, the significant decline ⅛in margins occurred despite apparent efforts to contain Medicare operating costs (Table A-23).

Table A–22. Trends in Hospital PPS Operating Margins: PPS1–PPS3

Hospital Types	Median	10th Percentile	90th Percentile
All			
PPS1	10.8	-5.5	22.2
PPS2	11.0	-7.1	24.6
PPS3	4.9	-23.2	19.8
Urban			
PPS1	13.7	1.6	24.6
PPS2	14.3	0.2	26.4
PPS3	7.9	-9.1	21.9
Rural			
PPS1	7.6	-10.3	20.1
PPS2	7.7	-12.5	22.7
PPS3	0.9	-32.6	17.0
SCH			
PPS1	6.0	-16.8	20.6
PPS2	3.3	-17.7	21.7
PPS3	-0.5	-37.3	15.7
Rural <50 beds			
PPS1	6.3	-21.1	22.1
PPS2	5.4	-31.0	23.9
PPS3	-1.7	-48.2	20.6

SOURCE: Preliminary ProPAC estimates based on Medicare Cost Report data from the first three years of PPS for 2233 hospitals. Excludes hospitals in Maryland, Massachusetts, New Jersey, and New York.

Implications—The findings reported above are preliminary. More complete data and analyses of all hospitals will be reported in the Commission's June 1988 report to Congress, *Medicare Prospective Payment and the American Health Care System*.

The findings should also be interpreted with some caution since they do not reflect PPS policy changes since the third year of PPS. Legislative changes in outlier policy, the shift to discharge weighted standardized amounts, and provision of higher updates should improve the relative financial status of all rural hospitals, including SCHs. For SCHs, however, discharge weighting and outlier policy change will have a relatively small impact, since only the 25 percent Federal payment portion of the rate is affected.

Based on the information available, the Commis-sion has concluded that a comprehensive evaluation should be made of the financial protection afforded by current SCH policies. Commission efforts will focus on describing hospitals that financially gain or lose under current policies and relating hospital financial position to SCH status.

Table A–23. Change in Aggregate Medicare Operating Costs, Cases, and Costs Per Case From PPS1–PPS3 (Percent Change)

	PPS1 to PPS2			PPS2 to PPS3			Average		
Hospital Type	Costs	Cases	Costs Per Case	Costs	Cases	Costs Per Case	Costs	Cases	Costs Per Case
All Hospitals	2.5	-6.8	10.0	6.5	-3.6	10.4	4.5	-5.2	10.2
Urban	3.5	-6.0	10.2	6.7	-2.8	9.8	5.1	-4.4	10.0
Rural	-1.5	-8.7	7.9	5.6	-5.6	11.8	2.0	-7.1	9.8
SCH	-2.5	-10.1	8.4	1.7	-5.0	7.0	-0.4	-7.6	7.7
Rural <50 beds	-3.9	-11.4	8.5	0.4	-8.6	9.8	-1.7	-10.0	9.2

SOURCE: Preliminary ProPAC estimates based on Medicare Cost Report data from the first three years of PPS for 2233 hospitals. Excludes hospitals in Maryland, Massachusetts, New Jersey, and New York.

Appendix B
DRG Classifications and Weighting Factors

Appendix B
DRG Classifications and Weighting Factors

INTRODUCTION

A major responsibility of the Commission is to recommend adjustments to the DRG classifications and weighting factors. These adjustments are required to reflect the development of new technologies and changing patterns of medical practice. They are also necessary to correct deficiencies in the DRG classification system. Appendix B presents background information and analyses related to the Commission's deliberations and recommendations in these areas.

The Commission recommended annual recalibration of the DRG weights in its second annual report to the Secretary of the Department of Health and Human Services (HHS). Congress supported ProPAC's recommendation and legislated annual recalibration beginning in fiscal year 1988. Information presented here supports the Commission's position that annual recalibration is needed to update DRG relative weights to reflect the impact of changing technologies and practice patterns. ProPAC also performed an analysis of the two methods for recalibrating DRG relative weights. The Commission concluded annual recalibration should be based on cost-based rather than charge-based weights beginning in fiscal year 1989.

The Commission addressed a number of issues related to specific DRG classifications and weights. A table of technology and medical practice topics previously reviewed or currently under review is presented. The table provides an up-to-date listing of ProPAC's activities related to these topics. ProPAC also conducted several studies of DRG classifications. One study examined ways to reduce the large volume of miscellaneous, unrelated surgical cases assigned to DRG 468. Separate studies examined the effect of recent changes in the classification of cases undergoing major joint procedures or receiving mechanical ventilation. Other studies evaluated the adequacy of PPS payments for patients with Acquired Immune Deficiency Syndrome (AIDS) and for patients receiving various thrombolytic agents for the treatment of acute myocardial infarction. ProPAC also studied the adequacy of payments to several groups of specialty center hospitals and units. The Commission concluded payments should be increased for outlier cases in burn centers.

The Commission continues to believe that DRGs are the most appropriate measure of hospital case mix for PPS. ProPAC convened a technical advisory conference to gather information on recent developments in alternative case-mix systems. The conference led the Commission to support its previous conclusion that no system is ready to replace or modify the DRGs in the short term. The Commission also examined ways to improve the rules for assigning diagnostic codes to patients. Improvements in these coding rules will produce more accurate DRG assignments.

ProPAC completed a study of several aspects of outlier payment policy. The Commission concluded more outliers should be identified and paid on the basis of cost rather than length of stay.

Several of the analyses described below use payment differences calculated by subtracting estimated 1986 costs from simulated 1986 payments. Payments were simulated by applying 1988 payment rules to estimated 1986 payment levels. Costs were calculated as the sum of routine and special care per-diem costs and ancillary costs from fiscal year 1986 Medicare inpatient bills. Ancillary costs were estimated by applying hospital departmental cost-to-charge ratios to charges. The ratios of costs to charges (RCCs) were computed from second-year PPS Medicare Cost Reports.

The intent of this approach is to reflect current payment policy, but at levels consistent with the most recent available cost data. Absolute differences between payments and costs shown in the tables that follow are *not* estimates of actual gains or losses. These differences can be used only for comparing relative payment differences of cases within DRGs, across DRGs, or across hospital groups.

WEIGHT CHANGES RESULTING FROM RECALIBRATION AND GROUPER CHANGES

Recalibration is the process of recomputing the relative weights of all DRGs. ProPAC recommended annual recalibration of the DRG weights in its second annual report in April 1986. The Commission believes annual recalibration is necessary to account for changes in medical practice, technology, and discharge abstract coding. These changes affect the relative resource use of cases across the DRGs.

Changes in the DRG Grouper program also produce changes in the DRG relative weights. Grouper changes involve the reclassification of cases from one DRG to another. These changes are necessary to improve patient classification. They do not, however, represent changes over time in the relative resource use of DRGs.

Factors Affecting DRG Weights

Several factors have an effect on changes in the relative weights of DRGs:

- Data availability,
- Measures of resource use,
- Grouper changes, and
- Coding improvements.

The remainder of this section presents information on the impact of the fiscal year 1988 recalibration and Grouper changes on DRG weights. For comparison, this section also includes the impact of the fiscal year 1986 recalibration and Grouper changes on DRG weights.

Data Availability—The DRG weights used when PPS began in fiscal year 1984 were based on patient-level data from calender year 1981. This data base was limited because it contained only one diagnosis and one procedure code for each case. The first recalibration, for fiscal year 1986, used a data base from fiscal year 1984 with more detailed diagnostic information. This change improved the accuracy of the weights because DRG assignments were based on more complete information. The second recalibration, for fiscal year 1988, used data with the same level of diagnostic detail that was available for the first recalibration. Therefore, increased data availability had no impact on the second recalibration.

Measures of Resource Use—The original DRG weights were calculated using cost-based data. The first recalibration, however, calculated DRG weights using charge-based data. A previous study conducted by ProPAC showed that this change did not have a large effect on the relative weights of most DRGs. For a small percentage of DRGs, however, the relative weights changed by more than five percent. The second recalibration also used charge-based data for calculating new DRG weights. The effect of using charge-based rather than cost-based weights for the fiscal year 1988 recalibration is discussed later in this Appendix.

Grouper Changes—During the first recalibration, version 2.0 of the Grouper program was replaced with version 3.0. The differences between these two versions were relatively minor, except in a few DRGs. Therefore, the number of cases reclassified to different DRGs was small.

During the second recalibration, version 4.0 of the Grouper program was replaced with version 5.0. The effect of this change was substantial. The most significant change was the elimination of age seventy or greater as a variable for defining DRGs. This change affected about 43 percent of the DRGs, and caused many cases to be reclassified to different DRGs.

Coding Improvements—PPS created strong incentives for hospitals to improve the quality of the diagnostic information recorded on the discharge abstract. In a previous study, the Commission found that the average number of diagnoses and procedures recorded on discharge abstracts in-

creased since the start of PPS. The number of cases with complications and comorbidities also increased.

Coding improvements produce more accurate DRG assignments. They may also cause more cases to be assigned to higher weighted DRGs, especially for DRGs that split on the presence of a complication or comorbidity. Both the first and the second recalibration occurred during periods of rapid change in the coding of diagnoses and procedures. Therefore, ProPAC believes coding improvements had a major effect on the change in DRG relative weights after both recalibrations.

Impact of Recalibration and Grouper Changes

The effect of the two recalibrations was quite different as shown in Table B-1. More DRGs had increases in their relative weights than decreases from the fiscal year 1988 recalibration. Furthermore, almost 60 percent of the cases were in DRGs that had increases in their relative weights. In contrast, a majority of DRGs and cases had decreases in their relative weights after the first recalibration. The changes in DRG relative weights associated with each recalibration were budget neutral and did not affect the total level of payments.

The effect of the two recalibrations on selected groups of DRGs is shown in Table B-2. The first recalibration produced small increases in the average weight of surgical cases, and cases with age seventy and older or with a complication or comorbidity (CC). The second recalibration, however, produced a small decrease in the average weight of surgical cases, and a large increase in the average weight of cases with a CC. This latter change reflects the effect of eliminating age seventy or greater from the DRG definitions. This change caused many cases that were age seventy or greater without a CC to be moved to lower weighted DRGs. This is primarily why most DRGs had weight increases without increasing aggregate payments.

As shown in Table B-3, the first recalibration increased the average DRG weight and average case weight in DRGs with the most extreme relative weights. DRGs with the highest and lowest relative weights had increases, while medium-weighted DRGs had decreases. In contrast, the second recalibration increased the average DRG weight and average case weight for all DRGs except those with the highest weights.

Table B-1. Distribution of Percent Change in DRG Weights

	Fiscal Year 1986 Recalibration		Fiscal Year 1988 Recalibration	
Percent Change in DRG Weight	Percent of DRGs	Percent of Cases	Percent of DRGs	Percent of Cases
<-20	9.6	4.2	4.7	1.4
-10.1 to -20	14.8	9.9	12.4	7.0
-5.1 to -10	14.1	19.8	14.1	15.0
-0.1 to -5	14.8	29.8	14.3	17.2
0	7.7	<.01	6.8	<.01
0.1 to 5	11.3	9.6	14.1	25.5
5.1 to 10	9.0	14.3	12.2	11.6
10.1 to 20	9.8	9.4	13.0	17.9
20+	9.8	2.7	7.9	4.1

SOURCE: ProPAC analysis of MEDPAR data from fiscal years 1984 and 1986.

Table B-2. Percent Change in Average DRG Weights and Case Weights by Groups of DRGs

	Fiscal Year 1986 Recalibration		Fiscal Year 1988 Recalibration	
	Percent Change in Average:		Percent Change in Average:	
	DRG Weight	Case Weight	DRG Weight	Case Weight
Medical vs. Surgical DRGs				
Medical	-4.4	-4.0	+1.6	+0.2
Surgical	+5.1	+5.1	+3.0	-1.6
Age/CC Pairs				
Age <70 w/o CC	-10.5	-10.3	-10.0	-5.9
Age 70+ and/or CC	+1.1	+2.0	+14.9	+15.4

SOURCE: ProPAC analysis of MEDPAR data from fiscal years 1984 and 1986.

Table B–3. Percent Change in Average DRG Weights and Case Weights by Quartile Rank of DRG Weight

Fiscal Year 1986 Recalibration

Quartile	Range of DRG Weights		Percent of Fiscal Year 1985 Cases	Percent Change in Average:	
	Fiscal Year 1985	Fiscal Year 1986		DRG Weight	Case Weight
0–25	0.1823 - 0.6236	0.1137 - 0.6097	9.3	+10.4	+2.1
25–50	0.6271 - 0.8808	0.6104 - 0.8330	28.3	-5.9	-4.1
51–75	0.8826 - 1.3659	0.8333 - 1.3525	38.3	-5.5	-2.1
76–100	1.3711 - 6.7918	1.3572 - 7.5688	24.0	+3.3	+3.2

Fiscal Year 1988 Recalibration

Quartile	Range of DRG Weights		Percent of Fiscal Year 1987 Cases	Percent Change in Average:	
	Fiscal Year 1987	Fiscal Year 1988		DRG Weight	Case Weight
0–25	0.1136 - 0.6156	0.1309 - 0.6035	13.2	+3.7	+2.7
25–50	0.6175 - 0.8332	0.6088 - 0.8603	29.1	+0.3	+0.4
51–75	0.8382 - 1.3522	0.8620 - 1.3979	35.7	+2.5	+2.5
76–100	1.3548 - 12.3234	1.4018 - 11.9225	21.6	-1.9	-0.1

SOURCE: ProPAC analysis of MEDPAR data from fiscal years 1984 and 1986.

The data support the Commission's belief that rapid changes are occurring in the relative resource use of DRGs. The different effects of the two recalibrations suggest that these changes are not constant across DRGs over time. Annual recalibration is especially important when the changes in the relative costs of DRGs are not constant across DRGs.

Conclusions

Substantial changes in the relative resource use of DRGs have occurred since the first recalibration in fiscal year 1986. The Commission believes annual recalibration of the DRG relative weights is necessary to account for changes in medical practice patterns and technology. Furthermore, annual recalibration adjusts the DRG relative weights for coding improvements, which have been substantial since the beginning of PPS.

Annual recalibration, which affects all DRGs, is not necessary to account for changes in the Grouper program because these changes usually affect only a limited number of DRGs. However, Grouper changes have been implemented every year since the beginning of PPS. Annual recalibration should produce more accurate relative weights in DRGs affected by Grouper changes. It will also permit analysis of patterns of change in the DRG relative weights over time. The Commission will continue to monitor these patterns of change on an annual basis.

RECALIBRATION ANALYSIS COMPARING CHARGE-BASED AND COST-BASED DRG WEIGHTS

During 1987, the Commission analyzed two methods for recalibrating the DRG weights. The analysis compared weights calculated using charge data alone (charge-based weights) with weights calculated using charges that are adjusted by costs (cost-based weights). HCFA used charge-based weights for fiscal year 1988. The purpose of this analysis was to determine whether cost-based weights rather than charge-based weights should be used for recalibration.

Based on the results of this analysis, the Commission recommended that, beginning in fiscal year 1989, HCFA recalibrate the DRG weights using cost-based weights. A brief summary of the analytic findings and rationale for this decision is presented here. A more detailed description of the data, methods, and results will be released as part of ProPAC's Technical Report Series.

Background

The purpose of recalibration is to create an entirely new set of DRG weights. This is necessary to maintain weights that accurately reflect the relative costliness of inpatient care across DRGs as medical practice patterns and relative use of hospital resources change over time. Practice pattern changes may involve adding or dropping services, substituting more or less costly services, and shifting care to other settings (e.g., outpatient).

There are two basic methods for estimating relative costliness using Medicare data. The charge-based approach uses charge information from the hospital bill. The cost-based method adjusts these charges using cost information obtained from the Medicare Cost Reports (MCRs).

Costs are generally thought to reflect real resource use better than charges. Charges are set by hospitals based on many factors including estimated costs, market conditions, payer mix, and revenue maximization strategies. This process may result in charges that are significantly above or below the costs of resources used to produce the service. The variation in charge-setting practices also results in charges that are generally not comparable across hospitals.

On the other hand, the adequacy of the current data and methods for estimating costs is unclear. Some argue that the Medicare cost-finding methodology (i.e., step-down allocation, apportionment of costs between Medicare and other payers, and assignment of costs between PPS-related costs and pass-throughs) may distort estimates of true cost. Furthermore, ancillary level cost-to-charge ratios may not be accurate for all services provided within a department.

The original DRG weights were computed using 1981 patient-level charge data, adjusted using per-diem costs and cost-to-charge ratios from the 1981 MCRs. HCFA first recalibrated the weights for fiscal year 1986 using fiscal year 1984 patient billing data. Because recent cost report information was not available at the time, HCFA decided to develop these new weights based on charges alone.

The decision to use charge-based weights was supported by HCFA's and ProPAC's analyses using 1981 data. In these analyses, DRG weights computed using the original cost methodology were compared with weights based only on charge data. The results showed only small differences between the two sets of weights. Moreover, the hospital case-mix indexes (CMIs) based on each set of weights were very similar. Roughly 98 percent of hospitals had CMIs that differed by one percent or less.

In the most recent recalibration for fiscal year 1988, HCFA continued to use charges alone to calculate the DRG weights. This was in spite of the fact that MCR data were available from the second year of PPS. HCFA cited the original analysis of 1981 MCRs to support this decision. The Commission believed that the more recent cost data should be analyzed to determine if a return to cost-based weights was warranted.

The focus of this analysis is slightly different from the original analysis. In the original analysis, the question was whether it was appropriate to use charge-based weights because cost data were not available. In the current analysis, the relevant question is whether it is preferable to use charge-based weights. This involved two judgments by the Commission. The first was whether charge data alone or charge data adjusted for costs is more reflective of relative resource use. The second was whether the empirical results suggest that the differences between the two sets of weights is large enough to support a return to cost-based weights.

Results

The data sources used for this analysis included MCRs for the second year of PPS (PPS2) and the fiscal year 1986 MEDPAR file. The PPS2 MCR file contains hospital cost reports for accounting years beginning in fiscal year 1985. The 1986 MEDPAR file contains billed charge data and clinical characteristics for all Medicare inpatient hospital bills for fiscal year 1986.

The recalibration analysis compared charge-based weights, calculated using standardized total charges per case, with cost-based weights, calculated using standardized operating costs per case. The total charge weights are assumed to include capital and direct medical education costs while the operating cost weights do not. Because capital and direct medical education costs are currently paid on a pass-through basis, operating costs are more ap-

propriate than charges. Moreover, it is not possible to calculate "operating charges." Charges and costs were standardized to remove the effects of area wages, teaching and disproportionate share status, and cost-of-living adjustments for Alaska and Hawaii.

The results demonstrate that cost-based DRG weights and hospital CMIs are significantly different from current charge-based weights and CMIs. Major findings are summarized below.

The range of cost-based weights (highest weight minus lowest weight) is 12 percent lower than the range of charge-based weights. Thus, the cost-based weights are substantially "compressed" relative to charge-based weights. Similarly, hospital CMIs computed from cost-based weights are compressed relative to the charge-based CMIs. The range for the cost-based CMIs is 7 percent lower than the range for charge-based CMIs.

The correlation between the two sets of DRG weights is very high—the correlation coefficient is 0.9981. The weights for many DRGs, however, are very different under the two methodologies. Roughly 36 percent of the DRGs, accounting for 38 percent of the cases, have more than a five percent difference in weights.

The results are very different for medical and surgical DRGs. Cost-based weights are higher for 78 percent of the medical DRGs. By comparison, cost-based weights are higher for only 17 percent of the surgical DRGs. Thus, all other factors equal, cost-based weights would increase payments for medical DRGs and decrease payments for surgical DRGs.

The differential effects on medical and surgical DRGs probably result from the relatively high markups of charges over costs in the ancillary departments. Cost-based weights limit the ancillary contribution to the relative weights by excluding the markups. Because surgical DRGs tend to have a larger proportion of services provided in ancillary departments, cost-based weights, on average, are lower. Conversely, cost-based weights for medical DRGs tend to be higher.

Roughly 40 percent of the hospitals, accounting for 25 percent of the cases, have more than a two percent difference in their CMIs when cost-based weights are used instead of charge-based weights. Using cost-based weights instead of charge-based weights would have no effect on aggregate payments. However, 67 percent of the hospitals would have a higher CMI under cost-based weights.

The average CMI was one percent higher under the cost-based weight methodology before adjusting for budget neutrality. This uneven effect on the CMIs may result from a larger concentration of high-markup DRGs, primarily surgical DRGs, in a small subset of large hospitals. As a result, the overall CMI is higher for the vast majority of hospitals under cost-based weights.

Large urban and major teaching hospitals have CMIs more than one percent lower under cost-based weights. Rural hospitals, especially small rural and rural disproportionate share hospitals, and non-teaching hospitals have much higher CMIs under cost-based weights. Thus, the differences between cost-based weights and charge-based weights appear to be much larger than was observed in ProPAC's previous analysis of 1981 data.

Total cost weights that include capital and direct medical education costs were also compared with the operating cost weights. The results showed that for medical DRGs, operating cost weights are higher than total cost weights. For surgical DRGs, operating cost weights are lower than total costs weights.

This indicates that some of the compression from cost-based weights results from the exclusion of capital and direct medical education costs. These costs are assumed to be included in the charge-based weights. The majority of the compression, however, results from using estimated costs rather than charges in the calculation of the DRG weights.

Conclusions

These results demonstrate that the two sets of weights are not interchangeable. Although cost data are imperfect, they are more reflective of actual resource use than charges. The cost-based methodology for calculating DRG weights removes some of the variation in charges resulting from hospital charge-setting practices. Thus, the cost-based approach should be the preferred method until evidence suggests otherwise.

The Commission recognizes that uncertainty exists regarding the adequacy of the current data and methods for estimating costs. The Commission has urged the Secretary to devote the necessary resources to study the current Medicare cost-finding methods, and verify the adequacy of the cost report data or make the necessary improvements. The Commission will also devote resources to further study of this issue during 1988.

Recommendation

The DRG weights should be annually recalibrated on the basis of costs rather than charges. The Secretary should implement cost-based weights starting with the fiscal year 1989 recalibration. The Commission is concerned, however, about the current Medicare cost-finding methods for estimating costs. The limitations of the Medicare Cost Report data may, in some cases, produce imprecise DRG weights. Thus, the Secretary should verify the accuracy of the cost report data and implement changes as necessary.

DRG CLASSIFICATIONS AND WEIGHTS

One of the Commission's primary responsibilities is to ensure that the DRGs remain current. The DRGs require periodic adjustments to reflect new technologies, scientific advances, and changing medical practice. This section of the Appendix presents ProPAC's efforts in this area.

Following this introduction is a list of the specific technology and medical practice topics previously reviewed or currently under review by the Commission. It includes the topics considered, a brief description of the issue, and the Commission's action. This list is followed by several studies of potential incremental improvements to the DRG system. ProPAC's analysis of the appropriateness of PPS payments to specialty center hospitals and units follows the incremental improvement studies.

PROSPECTIVE PAYMENT ASSESSMENT COMMISSION

DRG CLASSIFICATION AND WEIGHT ANALYSIS

I. TOPICS UNDER REVIEW

Topic Number	TOPIC o Issue	CASE MIX MEASUREMENT AND PAYMENT ISSUES Technology or Changing Practice Patterns	Expensive Devices	Case Complexity	Diagnostic and Procedure Coding	Other DRG Assignment Issue
5-87	AIDS o The potential AIDS-related impact(s) on the Medicare program has been examined. o Additional analysis will be undertaken when data using new codes is available.	X			X	X
27-85	BURNS o Certain hospitals may treat more severely ill cases. o ProPAC supports current legislation that temporarily increases outlier payments for burn DRGs. ProPAC will continue its analysis and submit additional recommendations as required by Pub. L. 100-203.			X		
10-85	DERMATOLOGIC DISORDERS o Dermatology DRGs are heterogeneous. o The most resource-intensive cases are treated at tertiary care hospitals.			X	X	

Topic Number	TOPIC o Issue	CASE MIX MEASUREMENT AND PAYMENT ISSUES Technology or Changing Practice Patterns	Expensive Devices	Case Complexity	Diagnostic and Procedure Coding	Other DRG Assignment Issue
4-87	INTENSIVE NEURODIAGNOSTIC MONITORING AND SURGERY FOR EPILEPSY o Patients may be inappropriately classified with cases that are less resource intensive.	X		X	X	
9-87	TRAUMA CASES o The most resource-intensive cases may be treated in trauma centers.			X		

PROSPECTIVE PAYMENT ASSESSMENT COMMISSION

DRG CLASSIFICATION AND WEIGHT ANALYSIS

II. TOPICS FOR MONITORING

Topic Number	TOPIC o Issue	Status
4-85	CARDIAC PACEMAKERS o Financial incentives may discourage implantation of more expensive sophisticated pacemakers. o Payments may be inequitable across hospitals. o Alternative groupings of some discharges may be more appropriate.	o This topic is being reviewed as part of a study on Expensive Devices that Project Hope is conducting under contract. MEDPAR data from 1984-86 on the number of cases and the types of hospitals will be analyzed. o New codes were implemented on 10-1-87. Data will not be available for at least two years. ProPAC will monitor the work of others regarding this issue until a sufficient amount of data become available. o Beginning September 1987, providers must report to HCFA detailed information about pacemakers and leads implanted in Medicare patients. This information will not be available for another year or two.
8-86	CATHETERIZATION AND OTHER CHANGES IN THE CARE OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION o Changing patterns of practice may not be reflected in current DRG classification. o Coding improvements are necessary for acute myocardial infarction cases.	o Coding improvements were recommended. o Monitoring and additional analysis of catheterization and other changes in the treatment of myocardial infarction will continue.
6-85	COCHLEAR IMPLANTATION o The current DRG assignment and weight may not be appropriate.	o The Secretary rejected the Commission's recommendation to assign these cases to a temporary, device-specific DRG. o New codes were implemented on 10-1-86. Data will not be available until 1988. ProPAC will monitor the work of others until a sufficient amount of data become available.

Topic Number	TOPIC o Issue	Status
13-85	ENDOCARDIAL ELECTRICAL STIMULATION o Practice pattern change regarding evaluation and treatment of threatening cardiac arrhythmias may change resource use.	o New codes are expected to be implemented 10-1-88. ProPAC will monitor the work of others until a sufficient amount of data become available.
15-85	EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY o Questions concerning the appropriateness of DRG assignment and payment continue.	o ProPAC's recommendation was implemented in 1986. Data will be available in 1988. ProPAC will monitor the work of others until a sufficient amount of data become available.
2-86	HEART TRANSPLANTATION o Heart transplantation became a covered service. o A weight has been determined for the heart transplant DRG.	o Data will not be available until 1988. ProPAC will monitor the work of others until a sufficient amount of data become available.
16-85	HEMOPHILIA o Patients may be inappropriately classified with cases that are less resource-intensive.	o A small number of patients with hemophilia are assigned to many DRGs. Improvements in outlier policy are necessary to improve payment problems. o This topic will be monitored to follow changes in clotting factor technology, costs, and outlier policy impact.

Topic Number	TOPIC o Issue	Status
3-86	IMPLANTABLE DEFIBRILLATOR o DRG assignment may not be appropriate for this new, costly device used in the treatment of ventricular arrhythmias that may lead to sudden death.	o The Secretary rejected the Commission's recommendation to assign these cases to a temporary, device-specific DRG. o HCFA will now assign cases to DRG 104 (with cardiac cath), DRG 105 (without cardiac cath), or DRG 120 (implant or replace leads or generator).
25-85	INFLATABLE PENILE PROSTHESES o The cost of this device is higher than alternative prostheses and many other cases in the DRG to which it is assigned.	o This topic is being reviewed as part of a study on expensive devices that Project Hope is conducting under contract. MEDPAR data from 1984-86 on the number of cases and the types of hospitals will be analyzed.
18-85	LYMPHOMAS AND LEUKEMIAS o These DRGs are heterogeneous. Payments may be inadequate. o Patients on research protocols may have higher costs.	o ProPAC's recommendation for improvements in DRG assignment was modified and implemented in FY 87. o DRG assignment and payment is generally appropriate. DRG 473 will be monitored and the impacts of outlier policy changes will be examined. o ProPAC is monitoring the NIH study of the costs of patients on research protocols.
19-85	MAGNETIC RESONANCE IMAGING o Current payments at the DRG level do not recognize the increased costs related to MRI.	o ProPAC has twice made a recommendation for an add-on payment, neither of which has been implemented by the Secretary. o ProPAC will monitor the diffusion and use of this technology.

Topic Number	TOPIC o Issue	Status
6-87	NONIONIC CONTRAST AGENTS o Nonionic and low-osmolar contrast media are now available for diagnostic angiography and myelography procedures. o These contrast agents improve quality of patient care by reducing side effects and patient discomfort. o Because of the hospital-level expense, hospitals have been reluctant to change to these new contrast agents.	o The Commission will monitor the research being conducted by the Johns Hopkins Program for Medical Technology and Practice Assessment on low-osmolar contrast agents.
3-87	PARTIAL KNEE REPLACEMENT o Cases may be more resource intensive than other cases in the DRG.	o A specific ICD-9-CM code was recommended to the ICD-9-CM Coordination and Maintenance Committee. o ProPac will examine DRG assignment of these cases once information based on a new specific code is available.
1-87	PERCUTANEOUS PROCEDURES o Patients may be inappropriately classified with cases that are more or less resource-intensive.	o Coding improvements have been implemented. o The appropriateness of DRG assignment will be examined when MEDPAR data are available.
21-85	PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY o ProPAC recommended in 1985 that cases in which PTCA is the principal procedure should be removed from DRG 108 and temporarily assigned to DRG 112 before recalibration.	o A unique code for PTCA became effective 10-1-86. The appropriateness of DRG assignment will be examined when MEDPAR data become available in 1988.

Topic Number	TOPIC o Issue	Status
29-85	RECONSTRUCTIVE JOINT PROCEDURES FOR PATIENTS WITH RHEUMATOID ARTHRITIS o Cases may be classified in DRGs with less resource-intense patients. o Payments may be inadequate. o Cases involving multiple joint replacements may be underpaid.	o This topic is being reviewed as part of a study on Expensive Devices that Project Hope is conducting under contract. MEDPAR data from 1984-86 on the number of cases and the types of hospitals will be analyzed. o ProPAC's recommendation for improvements in DRG assignment was modified and implemented in 1986; data will be available in 1988. ProPAC will monitor the work of others until more data become available.
22-85	SPINAL CORD INJURY o Referral centers may see the most resource-intensive cases.	o There are a small number of Medicare cases with a high percentage of outliers. Improvements in outlier policy will be monitored.
4-86	THROMBOLYTIC AGENTS o Thrombolytic agents are used to dissolve blood clots in the early treatment of heart attack patients. o Patients receiving these agents may have higher costs.	o The additional costs associated with these agents will be included within the science and technology component of the Update Factor. o Future recalibration will result in more appropriate DRG relative weights as the technology diffuses.
23-85	TOTAL PARENTERAL NUTRITION o Patients receiving TPN may have higher costs than other cases in a DRG.	o The Commission will monitor the work of others regarding patterns of use and costs of TPN, and the impact of PPS on TPN services. o Codes were assigned in FY 87. Data will not be available until 1988.

Topic Number	TOPIC o Issue	Status
2-87	VENTILATOR PATIENTS o New DRGs for patients receiving mechanical ventilation were implemented 10-1-87. o Potential payment inequities remain for ventilator patients outside MDC 4.	o The appropriateness of the current coding, DRG assignment, and payment will be monitored.

Topic Number	TOPIC o Issues	Topic is Not Currently Under Analysis Because:
1-85	ACUTE MYOCARDIAL INFARCTION o Changes in practice patterns since 1981 may have led to a decrease in the length of stay for patients treated for AMI. Resource utilization for patients may also be lower than in 1981.	o Annual recalibration of the DRG weights should account for practice pattern changes since 1981. o Because therapy is still evolving, analysis of changing treatment patterns will continue.
2-85	ALCOHOL AND DRUG DEPENDENCE o Rehabilitation and detoxification are separate treatments that use different resources. However, these cases are classified into the same DRG. o HCFA originally exempted alcohol/drug hospitals and distinct units for one year, but extended that exemption for a second year in its September 1985 regulations.	o The Secretary has implemented reclassification of the five substance and alcohol abuse DRGs to reflect more accurately the differences in resource use and LOS between alcohol detoxification and rehabilitation treatments.
24-85	ARTIFICIAL URINARY SPHINCTERS o Cases may be classified with less resource-intense patients. o Treatment involves high prosthetic device costs.	o Few Medicare beneficiaries undergo this procedure. o Coding improvements resulted in inadvertent changes in DRG assignment. This has been brought to HCFA's attention.
5-86	BALLOON DILATATION OF GASTROINTESTINAL SPHINCTERS o The procedure is not specifically recognized in current DRG classification. Therefore, cases are classified according to the medical conditions being treated.	o There is insufficient amount of information to do indepth analysis. o Using available data, staff found no problems resulting from these cases being classified in medical DRGs.

Topic Number	TOPIC o Issues	Topic is Not Currently Under Analysis Because:
10-86	BENIGN PROSTATIC HYPERTROPHY o Coding and assignment questions in patients with BPH/bladder neck obstruction may lead to payment inequities.	o ProPAC recommended the Secretary review all the codes in Chapter 16 of the coding system to establish consistent coding rules and guidelines and help insure more appropriate DRG assignment.
3-85	BONE MARROW TRANSPLANTATION o Patients undergoing bone marrow transplantation may be grouped into DRGs with cases requiring fewer resources. o This grouping problem exists because there are no specific procedure codes for bone marrow transplantation. Therefore, cases are classified according to the medical conditions being treated.	o Few Medicare beneficiaries undergo this procedure. Patients over the age of 65 are presently not considered candidates for this procedure. o This topic may be reviewed again when it becomes more widely adopted.
5-85	CATARACT EXTRACTION AND INTRAOCULAR LENS IMPLANTATION o Cataract extraction and the intraocular lens implantation should continue to be monitored to determine if the patients treated as hospital inpatients have changed with increased outpatient surgery. o Summary statistics for LOS and standardized charges for 1984, 1985, and 1986 are being developed.	o Summary statistics for 1984 to 1986 show an 85 percent decrease in inpatient cases with minimal changes in average age, LOS, or charges. o A research project to examine the shift in services to outpatient settings is being developed.
8-87	CHEMOTHERAPY o ProPAC looked briefly at DRG 410 (Chemotherapy) in 1985 and again in ProPAC's Systematic Evaluation, but concentrated largely on the lymphoma/leukemia DRGs because they appeared to involve more significant payment problems.	o This topic will be included in ProPAC's "Analysis of Variation in Resource Use". If the findings indicate that a disproportionate number of hospitals are treating a high proportion of high-cost cases, options for correcting the payment problems will be examined.

Topic Number	TOPIC o Issues	Topic is Not Currently Under Analysis Because:
9-86	CHRONIC OBSTRUCTIVE PULMONARY DISEASE o Coding and classification questions about COPD (including respiratory failure) patients may lead to inappropriate payments.	o ProPAC recommended the Secretary review all the codes in Chapter 16 of the coding system to establish consistent coding rules and guidelines and help ensure more appropriate DRG assignment. A new code for respiratory failure has been implemented. o A subset of patients, those requiring mechanical ventilation, are assigned to two new DRGs.
7-85	CORONARY ARTERY BYPASS GRAFT SURGERY o Length of stay for patients receiving coronary artery bypass graft surgery may have decreased since 1981. Consequently, this procedure may be reimbursed at a higher rate relative to alternative nonsurgical therapy that may be equally as effective in many cases.	o Annual recalibration of the DRG weights should account for practice pattern changes since 1981. o CABGs will be considered as a case example in a study of practice pattern variation.
8-85	CYCLOSPORINE o As a result of FDA approval of cyclosporine in 1983, length of stay for patients receiving organ transplants may have decreased.	o Annual recalibration of the DRG weights should account for the increased use of cyclosporine and the resulting decrease in LOS for patients receiving an organ transplant.
9-85	CYSTIC FIBROSIS o Cases are classified in DRGs with less resource-intensive patients.	o Medicare has very few patients with cystic fibrosis. The costs for these cases are higher than other cases and the current DRG structure may not be appropriate for other payers with more cases.

Topic Number	TOPIC o Issues	Topic is Not Currently Under Analysis Because:
11-85	DIABETES o Patients with a principal diagnosis of diabetes who receive a kidney transplant are grouped into DRG 468 (Unrelated Operating Room Procedure) instead of DRG 302 (Kidney Transplant). o The diabetes DRGs are split according to age and not complications and comorbidities.	o HCFA has reclassified diabetic transplant patients into DRG 302. o No reclassification is necessary for diabetes with complications and comorbidities. The current DRGs for diabetes account for complications and comorbidities.
12-85	DUAL JOINT PROCEDURES IN ONE HOSPITALIZATION o Develop descriptive statistics for both DRG 209 (single joint procedures) and the newly created DRG 471 (multiple joint) using FY 84-86 data.	o The creation of DRG 471 corrected the payment problem.
14-85	END STAGE RENAL DISEASE (ESRD) o "Admission for Dialysis" may not be appropriate as a principle diagnosis when ESRD patients are hospitalized. o The current ICD-9-CM system may not appropriately classify ESRD patients.	o HCFA is conducting a comprehensive analysis.
26-85	EPIKERATOPHAKIA o This is a new treatment for certain eye conditions. o Cases may be classified into a DRG with less resource-intensive patients. o There is currently no procedure code for this procedure.	o This procedure is not currently a Medicare-covered procedure. o Further analysis may be undertaken if the procedure is covered under the Medicare program and becomes more common among patients over age 65.

Topic Number	TOPIC o Issues	Topic is Not Currently Under Analysis Because:
1-86	HYPERTHERMIC ISOLATED PERFUSION o This new, more costly treatment for certain malignancies of the extremities is currently not covered by Medicare.	o Diagnostic and procedural coding may be inadequate to identify the procedure. o The procedure is not a Medicare-covered service.
6-86	HYPERTONIC SALINE INJECTIONS o This procedure is not specifically recognized in current DRG classification. Therefore, cases are classified according to the medical conditions being treated.	o There is an insufficient amount of information to do indepth analysis. o Using available data, staff found no problems resulting from these cases being classified in medical DRGs.
17-85	INFECTIVE ENDOCARDITIS o Length of stay from the 1981 MEDPAR database for patients being treated for infective endocarditis appears to be shorter than the recommended LOS for treatment.	o It appears that the arithmetic mean length of stay for patients being treated for infective endocarditis was appropriate. o There was some confusion between the arithmetic and geometric means.
7-86	INFLAMMATORY BOWEL DISEASE o A subset of IBD cases may be classified in DRGs with less resource-intensive patients.	o This topic will be included in ProPAC's "Analysis of Variations in Resource Use."
20-85	MALIGNANT EXTERNAL OTITIS MEDIA o Certain hospitals may treat more severely ill cases.	o This topic will be included in ProPAC's "Analysis of Variations in Resource Use."

Topic Number	TOPIC o Issues	Topic is Not Currently Under Analysis Because:
7-87	RAPID INFUSION SYSTEM (RIS) o The RIS is a new technology used when rapid blood loss occurs; it can deliver 1.5 liters of blood per minute.	o The estimated costs for the disposable items are relatively low when compared to the high range of total charges anticipated in the severely ill patients for whom this system is likely to be used. o The scientific and technological advancement component of the DAF should account for the relatively small unit costs of the RIS.
28-85	THORACO-ABDOMINAL AORTIC ANEURYSM RESECTION o This is a costly, new surgical procedure. o Cases may be classified in DRGs with less resource-intensive patients.	o The procedure is performed on a small number of individuals. o HCFA approved new ICD-9-CM codes for use effective 10-1-86.

Incremental Improvement Studies

The Commission continues to study ways to improve incrementally the classification of cases using the DRG system. During the past year, the Commission examined five issues dealing with potential incremental improvements to specific DRGs or groups of DRGs. These issues were: unrelated surgeries assigned to DRG 468, thrombolytic agents, major joint procedures, mechanical ventilation, and Acquired Immune Deficiency Syndrome (AIDS). The studies related to these issues are presented below.

DRG 468

DRG 468 is the miscellaneous category for all surgical cases with procedures that are clinically unrelated to their principal diagnoses. The Commission believes that refinements to this DRG are necessary to improve the accuracy of patient classification. In fiscal year 1986, DRG 468 was one of the 15 highest volume DRGs, with over 120,000 cases. Because DRG 468 is a miscellaneous category, it has considerable variation in resource use. It also has the highest number of outliers of all DRGs. Finally, DRG 468 is not clinically coherent because it contains all unrelated combinations of principal diagnosis and surgical procedure.

The Grouper program assigns cases to DRG 468 in the following way. First, it groups all cases into one of 23 Major Diagnostic Categories (MDCs) according to principal diagnosis. Then it assigns surgical cases to a DRG using an MDC-specific list of procedures. These lists were developed using clinical judgment to identify procedures related to the principal diagnoses in each MDC. Finally, the Grouper program assigns any surgical case with no procedures on the MDC-specific list to DRG 468.

For fiscal year 1988, the Secretary implemented several changes in the Grouper program to improve the clinical coherence of DRG 468. These changes, however, will not substantially reduce the variation in resource use, the large number of cases, or the large number of outliers in DRG 468.

The Commission contracted with Project HOPE to study three options for reducing the large volume of cases assigned to DRG 468. Each option modified the Grouper program to reassign cases from DRG 468 to new or existing DRGs. Based on the findings of this study, the Commission believes the best approach is to reassign cases from DRG 468 to existing DRGs using resequenced secondary diagnoses.

Options for Reassigning Cases from DRG 468—The Grouper program was modified to reassign cases from DRG 468 to other DRGs using:

- Principal diagnoses,
- Surgical procedures, and
- Secondary diagnoses.

Project HOPE conducted this study using a ten percent sample of DRG 468 cases from the fiscal year 1986 MEDPAR file. Cases were assigned to existing DRGs using the fiscal year 1988 version of the Grouper program.

Option 1: Reassignment Using Principal Diagnoses—The Grouper program was modified to reassign cases to one of 23 Major Diagnostic Categories (MDCs) using principal diagnoses. Then, cases were assigned to one of two new DRGs for unrelated surgical procedures in each MDC; one for cases without complications and comorbidities (CCs), and one for cases with CCs. This option produced 34 new DRGs, because only 17 MDCs have lists of unrelated surgical procedures.

Option 2: Reassignment Using Surgical Procedures—The Grouper program was modified to reassign cases to new DRGs that represent clinically similar groups of surgical procedures. Surgical procedure groups were created using the 16 body systems defined in Volume 3 of the *International Classification of Diseases - 9th Revision - Clinical Modification* (ICD-9-CM) coding manual. Each procedure group was then split on the presence or absence of a CC to produce a total of 32 new DRGs.

Option 3: Reassignment Using Secondary Diagnoses—The Grouper program was modified to reassign cases to existing DRGs using secondary rather than principal diagnoses. First, each secondary diagnosis was resequenced and treated as a principal diagnosis. The original principal diagnosis was treated as a secondary diagnosis. Then, the

Grouper determined a DRG assignment based on each resequenced secondary diagnosis. This process could produce as many as four alternative DRG assignments, because Medicare cases have up to four secondary diagnoses on their discharge abstract. Cases with multiple DRG assignments were assigned to the highest-weighted DRG, reflecting the most resource-intensive procedure performed.

Findings—The findings are presented in Tables B-4 through B-10. Option 1 does not substantially change the distribution of cases across MDCs. As Table B-4 shows, the distribution of cases reassigned using principal diagnoses is very similar to the distribution of all other Medicare cases. The majority of cases were reassigned to MDC 5 (Circulatory), MDC 4 (Respiratory), MDC 1 (Nervous), and MDC 6 (Digestive).

Summary statistics for the 34 new DRGs created under Option 1 are shown in Table B-5. Twenty-six of the 34 new DRGs have a substantial number of cases (i.e., more than 500). The coefficient of variation for standardized cost is lower in 32 of the 34 new DRGs than the coefficient of variation for DRG 468.

Among other factors, variance reduction statistics (R-squareds) were used to compare the three options. The reduction in unexplained variance, as indicated by an increase in the R-squared statistic, was the basis for comparison.

The variance reduction is 11 percent using the 34 new DRGs under Option 1. This is slightly greater than the variance reduction of almost 8 percent achieved by dividing DRG 468 into two DRGs; one for cases with a CC and one for cases without a CC.

Table B–4. Distribution of Cases Reassigned to a New MDC–Specific DRG Using Principal Diagnosis (Option 1)

		FY 86 MEDPAR Data		DRG 468	
MDC	Disease Type	Cases	Percent	Estimated Cases	Percent
5	Circulatory	2,403,601	25.1	26,550	23.0
4	Respiratory	1,205,814	12.6	20,620	17.9
6	Digestive	1,160,555	12.1	10,890	9.4
8	Musculoskeletal	894,685	9.3	7,020	6.1
1	Nervous	822,304	8.6	14,520	12.6
11	Kidney & Urinary	489,025	5.1	7,510	6.5
10	Endocrine, Nutritional, & Metab	373,624	3.9	5,590	4.8
7	Hepatobiliary & Pancreas	308,549	3.2	3,200	2.8
12	Male Reproductive	282,132	2.9	1,880	1.6
9	Skin, Subcut. Tissue & Breast	277,540	2.9	4,190	3.6
17	Myeloproliferative	214,024	2.2	0	0.0
18	Infections	161,427	1.7	0	0.0
21	Injuries	154,761	1.6	6,710	5.8
3	Ear, Nose, Throat	132,765	1.4	1,350	1.2
19	Mental	130,981	1.4	0	0.0
2	Eye	130,131	1.4	620	0.5
	DRG 468	121,801	1.3	0	0.0
13	Female Reproductive	120,674	1.3	680	0.6
16	Blood Forming Organs	107,889	1.1	3,990	3.5
20	Alcohol/Drug	45,024	0.5	0	0.0
23	Health Status Factors	43,007	0.4	0	0.0
22	Burns	5,913	0.1	70	0.1
14	Pregnancy & Childbirth	4,439	<0.05	30	0.0
15	Neonatal	136	<0.05	0	0.0
	Totals	9,590,801	100.0	115,420	100.0

SOURCE: Analysis of fiscal year 1986 MEDPAR data conducted by Project HOPE, under contract with ProPAC.

Table B–5. Summary Statistics for Cases Reassigned to a New DRG Using Principal Diagnosis (Option 1)

Without CC

MDC	Disease Type	Estimated Cases	Average Standardized Cost	Coefficient of Variation
21	Injuries	3,490	$1718	95.1
14	Pregnancy & Childbirth	20	1831	55.6
12	Male Reproductive	670	2605	70.1
6	Digestive	3,290	3063	90.9
11	Kidney & Urinary	2,100	3082	93.8
13	Female Reproductive	180	3299	119.9
16	Blood Forming Organs	970	3348	73.7
3	Ear, Nose, Throat	430	3371	91.6
5	Circulatory	6,790	3424	84.2
2	Eye	290	3461	93.0
9	Skin, Subcut Tis & Breast	1,480	3771	99.1
7	Hepatobiliary & Pancreas	720	4080	71.1
8	Musculoskeletal	1,960	4205	77.4
10	Endocrine, Nutri & Metab	1,580	4207	83.6
4	Respiratory	3,450	4663	85.0
1	Nervous	3,620	5108	95.3
22	Burns	10	11808	0.0
	Totals for All Cases w/o CCs	**31,050**	**$3606**	87.8

With CC

MDC	Disease Type	Estimated Cases	Average Standardized Cost	Coefficient of Variation
14	Pregnancy & Childbirth	10	$3408	0.0
21	Injuries	3,220	3945	113.8
2	Eye	330	4452	56.0
13	Female Reproductive	500	7145	81.3
12	Male Reproductive	1,210	7264	98.7
3	Ear, Nose, Throat	920	7413	93.0
10	Endocrine, Nutri & Metab	4,010	7466	86.8
6	Digestive	7,600	7525	90.2
5	Circulatory	19,760	7651	98.9
16	Blood Forming Organs	3,020	7861	97.6
7	Hepatobiliary & Pancreas	2,480	7960	91.4
9	Skin, Subcut Tis & Breast	2,710	8184	87.4
8	Musculoskeletal	5,060	8464	92.3
11	Kidney & Urinary	5,410	8552	104.5
4	Respiratory	17,170	10004	91.1
1	Nervous	10,900	11619	106.0
22	Burns	60	14025	103.6
	Totals for all Cases w CCs	**84,370**	**$8602**	**96.4**
	Totals for Current DRG 468	**115,420**	**$7258**	**109.5**

SOURCE: Analysis of fiscal year 1986 MEDPAR data conducted by Project HOPE, under contract with ProPAC.

Table B–6. Summary Statistics for Cases Reassigned to a New DRG Using Procedure Groups (Option 2)

Without CC

Procedure Group	Estimated Cases	Average Standardized Cost	Coefficient of Variation
Obstetrical	10	$1142	0.0
Eye	3,890	2065	77.2
Ear	440	2417	72.4
Nose & Mouth	1,690	2427	97.9
Miscellaneous	70	2448	91.0
Hemic & Lymph	270	3105	53.5
Urinary	2,040	3132	77.9
Digestive	7,680	3239	90.2
Integumentary	1,740	3374	73.2
Female Reproductive	1,950	3684	96.9
Musculoskeletal	3,360	4075	105.2
Male Reproductive	4,010	4474	64.8
Endocrine	300	4481	124.7
Nervous	820	4668	101.2
Respiratory	570	5008	133.4
Cardiovascular	2,210	6547	84.7
Totals for All Cases w/o CCs	**31,050**	**$3606**	**87.8**

With CC

Procedure Group	Estimated Cases	Average Standardized Cost	Coefficient of Variation
Obstetrical	10	$3575	0.0
Eye	4,150	3822	101.0
Ear	320	5093	92.9
Nose & Mouth	1,330	5639	112.3
Miscellaneous	180	5663	61.4
Female Reproductive	2,610	5671	80.6
Hemic & Lymph	790	5865	89.4
Urinary	7,070	6288	80.9
Integumentary	5,050	6746	83.8
Male Reproductive	11,240	7077	64.3
Nervous	1,600	8556	81.4
Musculoskeletal	8,570	9287	88.7
Digestive	25,900	9559	107.6
Cardiovascular	12,360	10663	84.4
Endocrine	470	12874	129.4
Respiratory	2,720	18537	116.9
Totals for All Cases w CCs	**84,370**	**$8602**	**96.4**
Totals for Current DRG 468	**115,420**	**$7258**	**109.5**

SOURCE: Analysis of fiscal year 1986 MEDPAR data conducted by Project HOPE, under contract with ProPAC.

Summary statistics for the 32 new DRGs created under Option 2 are shown in Table B-6. The findings are very similar to those for Option 1. Twenty-six of the 32 new DRGs have a substantial number of cases. The coefficient of variation is lower in 27 of the 32 new DRGs than in DRG 468. The variance reduction using these 32 new DRGs is 15 percent.

The distribution of cases across DRGs under Option 3 is somewhat different from the current distribution of cases, as shown in Table B-7. The majority of cases were reassigned to DRGs in MDC 6 (Digestive), MDC 11 (Kidney and Urinary), MDC 5 (Circulatory), and MDC 18 (Infections). This distribution reflects the high volume of digestive, urinary, and cardiovascular procedures in DRG 468.

Table B-8 shows the distribution of cases across selected DRGs under Option 3. A majority of the cases were reassigned to 15 DRGs or DRG pairs. A DRG pair consists of two DRGs that differ only by the presence or absence of a CC. In total, cases were reassigned to 138 different DRGs and DRG pairs. The variance reduction using this option was 24 percent, about twice the amount using the other two options.

Table B-9 shows the percent of cases with multiple DRG reassignments under Option 3. Most cases were reassigned to a single existing DRG. About one-third of the cases could have been reassigned to multiple DRGs. In this study, these cases were assigned to the DRG with the highest relative weight. Finally, almost 13 percent of cases remained in DRG 468 because they could not be reassigned to an existing DRG.

Table B–7. Distribution of Cases Reassigned to an Existing DRG Using Resequenced Secondary Diagnoses (Option 3)

		FY 86 MEDPAR Data		DRG 468	
MDC	Disease Type	Cases	Percent	Estimated Cases	Percent
5	Circulatory	2,403,601	25.1	9,850	8.5
4	Respiratory	1,205,814	12.6	2,570	2.2
6	Digestive	1,160,555	12.1	19,850	17.2
8	Musculoskeletal	894,685	9.3	6,250	5.4
1	Nervous	822,304	8.6	1,720	1.5
11	Kidney & Urinary	489,025	5.1	14,240	12.3
10	Endocrine, Nutritional, & Metab	373,624	3.9	5,520	4.8
7	Hepatobiliary & Pancreas	308,549	3.2	2,600	2.3
12	Male Reproductive	282,132	2.9	5,280	4.6
9	Skin, Subcut. Tissue & Breast	277,540	2.9	4,930	4.3
17	Myeloproliferative	214,024	2.2	3,890	3.4
18	Infections	161,427	1.7	8,570	7.4
21	Injuries	154,761	1.6	1,580	1.4
3	Ear, Nose, Throat	132,765	1.4	1,320	1.1
19	Mental	130,981	1.4	3,330	2.9
2	Eye	130,131	1.4	3,930	3.4
	DRG 468	121,801	1.3	14,620	12.7
13	Female Reproductive	120,674	1.3	2,630	2.3
16	Blood Forming Organs	107,889	1.1	350	0.3
20	Alcohol/Drug	45,024	0.5	250	0.2
23	Health Status Factors	43,007	0.4	2,100	1.8
22	Burns	5,913	0.1	0	0.0
14	Pregnancy & Childbirth	4,439	<0.05	30	0.0
15	Neonatal	136	<0.05	10	0.0
	Totals	9,590,801	100.0	115,420	100.0

SOURCE: Analysis of fiscal year 1986 MEDPAR data conducted by Project HOPE, under contract with ProPAC.

Table B–8. Distribution of Cases Reassigned to Existing DRGs (Option 3)

DRG	MDC	Procedures	Estimated Cases
468		Any Procedure	14,620
415	18	Infections	8,570
306/307	11	Prostatectomies	5,600
157/158	6	Hemorrhoidectomies	5,520
292/293	10	Endoc, Nutrit & Metab	4,870
154/155	6	Stomach	3,610
115/116	5	Pacemakers	3,380
424	19	Any Procedure	3,330
336/337	12	TURPs	3,280
148/149	6	Small & Large Bowel	3,130
39	2	Lens	3,080
310/311	11	Transurethral	2,970
161/162	6	Hernia	2,920
315	11	Kidney & Urinary	2,180
461	23	Any Procedure	2,100
Totals		138 DRGs or DRG Pairs	115,420

NOTE: Almost 60% of the cases would be reassigned to the 15 DRGs and DRG pairs listed above.

SOURCE: Analysis of fiscal year 1986 MEDPAR data conducted by Project HOPE, under contract with ProPAC.

The effect of Option 3 on the relative weights of existing DRGs would probably be small. As shown in Table B-10, the average cost per case would change by less than ten percent for the vast majority of DRGs to which cases could be reassigned.

Conclusions—By design, all three options for reassigning cases from DRG 468 improve clinical coherence. The Commission believes, however, that Option 3 is the best approach for improving DRG 468. First, it does not require any new DRGs. Most cases in this study (88 percent) could be reassigned to an existing DRG. Second, the average cost of cases reassigned from DRG 468 is very similar to the average cost of cases already in each existing DRG. Therefore, this approach is unlikely to have a substantial effect on DRG relative weights.

The Commission's approach represents a departure from the current assignment principles of the DRG system. It permits secondary rather than principal diagnoses to determine DRG assignment for cases in DRG 468. The Commission believes this change is justified because cases in DRG 468 cannot be assigned to existing surgical DRGs using principal diagnoses.

The Commission's approach is similar to the assignment principles of other patient classification systems, such as Disease Staging and Patient Management Categories. Unlike DRGs, these systems examine all diagnoses regardless of their sequence to determine the patient's underlying disease condition. The Commission believes its approach substantially improves patient classification without greatly increasing the complexity of the DRG system.

Recommendation—The Secretary should reassign cases from DRG 468 to existing surgical DRGs. These cases should be reassigned using secondary, rather than principal diagnoses. Cases that can be reassigned to more than one DRG should be assigned to the DRG with the highest relative weight.

Table B–9. Types of Reassignments Using Resequenced Secondary Diagnoses (Option 3)

Cases that could:	Estimated Cases	Percent
1. Not be reassigned	14,620	12.7
2. Be reassigned to only one DRG	61,110	52.9
3. Be reassigned to more than one DRG	39,690	34.4
Totals	115,420	100.0

SOURCE: Analysis of fiscal year 1986 MEDPAR data conducted by Project HOPE, under contract with ProPAC.

Table B–10. Percent Change in Average Standardized Costs After Reassigning Cases (Option 3)

Percent Change in Average Cost per Case	Percent of DRGs and DRG Pairs	Percent of Cases
Less Than -10.0	1.9	4.8
-5.1 to -10.0	0.6	0.2
-0.1 to -5.0	14.7	5.3
No change	12.2	3.4
0.1 to 5.0	53.2	75.1
5.1 to 10.0	10.3	8.9
More Than 10.0	7.1	2.3
Totals	100.0	100.0

SOURCE: Analysis of fiscal year 1986 MEDPAR data conducted by Project HOPE, under contract with ProPAC.

Thrombolytic Agents

Occlusion of coronary arteries by blood clots has been demonstrated in the majority of patients with acute myocardial infarction (MI) examined within six hours of the onset of symptoms. Administration of a thrombolytic agent in this time period has been shown to aid in restoring perfusion in occluded coronary arteries.

Tissue Plasminogen Activator (t-PA) is a genetically engineered thrombolytic agent recently approved by the U.S. Food and Drug Administration for use in treating MI. Thrombolytic therapy using streptokinase has been in use for a number of years. Until recently, however, streptokinase was approved only for intracoronary use.

This section summarizes the potential effect of thrombolytic therapy on Medicare costs for the treatment of MI cases and provides a number of payment options.

Efficacy—Streptokinase and urokinase are the two thrombolytic agents previously available for use in the treatment of MI cases. Streptokinase has been used far more frequently than urokinase. While there is disagreement, many experts believe that t-PA is more effective than streptokinase. Other experts believe that if given in the first two to three hours after MI, streptokinase is equally effective. There is also some disagreement among experts about the incidence of side effects. The major side effect of thrombolytic agents is bleeding. In theory, because of its clot specificity, t-PA should cause far fewer bleeding complications. However, the incidence of complications seems to be similar with the two agents.

Cost—The three cost components include the direct cost of the agent, the costs related to changing patterns of resource use per admission, and long-term savings. The list price of a single dose of t-PA is $2,332. This compares to $186 for a single dose of streptokinase.

There is little information on the indirect costs of thrombolytic agents. Thus far, all patients treated with t-PA have been on protocols that required cardiac catheterization and other tests not strictly essential to administration of t-PA. Many experts believe that the cost of the immediate hospitalization of patients receiving t-PA is about $2,000 to $3,000 more than for other MI patients. As described below, however, there could be short-term or long-term savings. A comparison of the average 1986 costs of patients in the MI DRGs is shown in Table B-11.

Patients receiving thrombolytic agents are likely to become candidates for further invasive procedures. Prevailing opinion is that increasing use of t-PA and other thrombolytics will increase the number of MI patients who undergo heart catheterization, percutaneous transluminal coronary angioplasty (PTCA), and possibly even coronary artery bypass graft surgery (CABG) during the initial hospitalization or subsequent hospitalizations. In fact, some experts assert that the administration of a thrombolytic agent will become a new indication for cardiac catheterization, although the appropriateness of such a trend is contested.

One recent study of 50 patients at the University of Michigan suggests that successful administration of t-PA allows safe discharge after three days. If thrombolytic therapy decreases length of stay, it could produce short-term or long-term savings of up to 30 percent. However, for a single hospital stay, the increased cost of the agent and other services may offset the savings from a decrease in length of stay. Also, there is disagreement as to whether a shorter stay is appropriate. Many experts believe that thrombolytic therapy could convert

Table B-11. Average Fiscal Year 1986 Costs for Cases with Acute Myocardial Infarction

DRG	Description	Average Cost
121	Circulatory disorders with AMI + C.V. Comp., Disch. Alive	$5449
122	Circulatory disorders with AMI w/o C.V. Comp., Disch. Alive	$3579
123	Circulatory disorders with AMI, Expired	$4428

SOURCE: ProPAC analysis of 1986 MEDPAR data.

what would be a complicated MI into one that is less complicated. If, for example, thrombolytic agents prevent patients from developing severe congestive heart failure, this would result in a long-term savings.

Effect on Medical Practice—Experts estimate that 25 percent of MI patients in the general population could be candidates for thrombolytic agents under current guidelines. To be a candidate, a patient must arrive at an emergency facility or hospital within six hours of the onset of chest pain. Certain diagnostic electrocardiographic criteria must be met and the patient must not have any absolute or relative contraindications, such as recent surgery, stroke, or bleeding problems. Although current protocols exclude patients over 72 from receiving t-PA, many experts believe patients of any age are candidates for the therapy. The therapy is expected to be rapidly adopted by cardiologists, primary care, and emergency room physicians.

Commission Action—The Commission considered a number of possible payment options for thrombolytic therapy. These included temporary DRGs created specifically for MI patients who receive thrombolytic therapy, or additional payments that include either the direct therapy costs alone or some combination of direct and indirect costs.

The Commission recommended including the cost of thrombolytic therapy in the science and technology component of the discretionary adjustment factor. This adjustment factor is an allowance to permit payments to keep pace with the costs of scientific and technological advances. The Commission estimated that 35,000 new MI cases would be candidates for thrombolytic therapy in fiscal year 1989. The Commission assumed that half the patients would receive t-PA at a cost of $2,332 and half would receive the less expensive thrombolytic agents at a cost of $186. Based on these assumptions, the total addition to the discretionary adjustment factor for thrombolytic therapy is about $44 million.

Because myocardial infarction is a disease that spans many patient populations, thrombolytic therapy is likely to diffuse rather rapidly among hospitals. As the charges for this therapy appear on Medicare hospital bills, future recalibration should result in more appropriate DRG relative weights.

Multiple Joint Replacement Procedures

At the initiation of the PPS, DRG 209 included all patients undergoing one or more major joint or limb reattachment procedures. Many groups were concerned that the payment for DRG 209 created a disincentive to perform more than one major joint procedure during the same hospital stay.

Before PPS, certain multiple lower extremity joint replacements were often performed during a single operative episode, or during the same hospital stay. However, some providers notified HCFA that after PPS was implemented they began performing these multiple joint replacements during separate hospital admissions. The American Academy of Orthopaedic Surgeons reported that this practice increases the health risks for Medicare beneficiaries. Performing multiple replacements during separate hospitalizations could also unnecessarily increase Medicare costs.

Analysis conducted by HCFA on cases in the 1984 PATBILL file with hip and knee replacements showed that payments for multiple major joint procedures were inadequate. The General Accounting Office also completed a study confirming that payments for these procedures were inadequate. They found that the average charges for multiple and single replacements were $15,408 and $10,536, respectively. In addition, there was a large disparity between hospital charges and payments for multiple replacements in DRG 209.

In response to these concerns, DRG 471, Bilateral or Multiple Major Joint Procedures, was added in fiscal year 1986. Cases having at least two major joint procedures, from a set of procedures included in DRG 209, were assigned to DRG 471. These procedures are listed in Table B-12. The fiscal year 1988 weight for DRG 471 is 4.0896, whereas the weight for DRG 209 is 2.4145.

The purpose of ProPAC's analysis was to determine if the change in the classification of cases with multiple major joint replacement resolved the previous payment inequities.

Table B-12. Multiple Joint Replacement Procedures Classified in DRG 471

Procedure	Procedure Code
Total Hip Replacement- Methacrylate Resin	81.51
Other Total Hip Replacement	81.59
Replacement Femoral Head- Methacrylate Resin	81.61
Replacement Femoral Head NEC	81.62
Replacement Acetabulum- Methacrylate Resin	81.63
Replacement Acetabulum NEC	81.64
Total Knee Replacement	81.41
Total Ankle Replacement	81.48

SOURCE: Federal Register, September 3, 1985.

Cases from DRG 209 and DRG 471 were selected from the 1986 MEDPAR file. They were compared by average length of stay, total operating costs, and payments. Costs were calculated using hospital per-diems and departmental RCCs applied to length of stay and charges on the 1986 MEDPAR file. PPS payments were calculated using fiscal year 1988 rules, deflated to reflect 1986 payment levels. These data allowed relative comparisons of costs and payments, but are not appropriate estimates of actual costs and payments.

Results—The distribution of cases by hospital groups is displayed in Table B-13. Multiple joint replacement cases represented 1.3 percent of the total sample of cases. Average length of stay, shown in Table B-14, was 65 percent higher for cases in DRG 471 than DRG 209.

Table B-15 compares the costs and payments for DRG 209 and DRG 471. The difference between payments and costs is an estimate, not an actual loss or gain. Payments were considered equitable by comparing this difference between DRG 209 and DRG 471 across hospital groups.

Conclusion—Based on this analysis, the previous payment inequities for multiple joint replacement cases appear to have been resolved.

Table B-13. Distribution of Cases From DRGs 209 and 471 by Hospital Group

Hospital Group	DRG 209	DRG 471
Total	170267	2289
Urban	138130	2205
Rural	32137	264
Non-Teaching	95876	1009
Minor Teaching	63155	1042
Major Teaching	11093	237

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Table B-14. Average Length of Stay: DRGs 209 and 471

Hospital Group	DRG 209	DRG 471
Group Average	13.7	20.9
Urban	14.0	21.3
Rural	12.6	17.9
Non-Teaching	13.2	20.3
Minor Teaching	14.2	21.1
Major Teaching	15.4	22.8

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Table B-15. Mean Total Operating Costs and Payments: DRGs 209 and 471

	DRG 209		DRG 471	
Hospital Group	Costs	Payments	Costs	Payments
Group Mean	$7700	$7800	$13100	$14000
Urban	8000	8300	13500	14500
Rural	6200	6000	10400	10200
Non-Teaching	7200	7100	12200	12400
Minor Teaching	8000	8300	13300	14600
Major Teaching	10200	10800	16800	18300

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Respiratory Failure And Mechanical Ventilation

Patients with respiratory failure requiring mechanical ventilation have been more costly than other patients. Respiratory failure coding rules have resulted in the assignment of many high-cost respiratory failure patients to low-weighted DRGs. HCFA examined the costs of mechanical ventilation patients to determine if payments for these cases were equitable.

HCFA's analysis compared the cost of ventilated and non-ventilated patients in Major Diagnostic

Category (MDC) 4, Diseases and Disorders of the Respiratory System. Ventilated patients were identified by the presence of one of the following procedure codes: 31.1, temporary tracheostomy; 31.21, mediastinal tracheostomy; 31.29, other permanent tracheostomy; or the combination of 93.92, other mechanical assistance to respiration, and 96.04, insertion of endotracheal tube. Their analysis showed that mechanical ventilation cases had average charges two to ten times greater than the average charges for other patients for each DRG in MDC 4. Based on this analysis, HCFA introduced DRG 474 (Tracheostomy) and DRG 475 (Mechanical Ventilation through Endotracheal Intubation) in fiscal year 1988 to recognize the higher treatment costs of mechanical ventilation cases.

The new DRGs may reduce the payment inequities for mechanical ventilation patients. The Commission is concerned, however, that using procedures, rather than diagnoses, to classify patients into these high-weighted DRGs provides incentives to promote the use of ventilators and tracheostomies. Furthermore, payment inequities may remain for ventilation patients outside MDC 4 and for surgical patients requiring longer-term ventilation in MDC 4.

ProPAC's analysis compared the difference in payments and costs between ventilated and non-ventilated patients in MDC 4, and conducted this same comparison in a sample of DRGs outside of MDC 4.

Cases with a principal diagnosis in MDC 4 and one of three tracheostomy procedure codes (31.1, temporary tracheostomy; 31.21, mediastinal tracheostomy; or 31.29, other permanent tracheostomy) are assigned to the new DRG 474. The fiscal year 1988 weight for DRG 474 is 11.8772. This weight reflects the use of tracheostomy procedure codes as proxies for long-term mechanical ventilation.

The new medical DRG 475 includes MDC 4 cases who receive both endotracheal intubation and mechanical ventilation (93.92, other mechanical assistance to respiration, and 96.04, insertion of endotracheal tube). DRG 475 recognizes the resources associated with mechanical ventilation of nonsurgical cases. Such ventilation is generally longer than surgical or post-surgical intubation, and therefore more resource intensive. Cases are assigned to DRG 475 only if no surgical procedure is performed. The fiscal year 1988 weight for DRG 475 is 3.1757.

HCFA also introduced a new ICD-9-CM code in fiscal year 1988 for respiratory failure: 518.81. Cases with this new diagnosis code are assigned to DRG 87 (Respiratory Failure and Pulmonary Edema). Before this change, respiratory failure was assigned code 799.1, which is in Chapter 16 of the ICD-9-CM coding manual. According to coding practices, Chapter 16 diagnoses should not be used to assign patients to a DRG. Patients requiring sustained mechanical ventilation are likely to have a diagnosis of respiratory failure. Previously, many respiratory failure patients were assigned to DRGs with low weights. The new respiratory failure code presents a clinically meaningful way to classify mechanical ventilation cases. It will also provide an opportunity to examine the DRG assignment of these high-cost cases and the adequacy of their payments.

MDC 4 Analysis—ProPAC examined cases in MDC 4 from the 1986 MEDPAR file. Costs were calculated using hospital-specific per-diems and departmental RCCs applied to length of stay and charges. PPS payments were calculated using fiscal year 1988 rules, deflated to reflect 1986 payment levels. Using 1988 payment rules, payments for mechanical ventilation cases in MDC 4 were much higher than similar cases outside of MDC 4.

The following DRGs from MDC 4 were selected for analysis: DRG 79 (Respiratory Infections and Inflammations); DRG 87 (Respiratory Failure and Pulmonary Edema); DRG 88 (Chronic Obstructive Pulmonary Disease); DRG 89 (Simple Pneumonia and Pleurisy); DRG 96 (Bronchitis and Asthma); and DRG 97 (Bronchitis and Asthma).

Three groups of cases were studied: tracheostomy (Group A), intubation and mechanical ventilation (Group B), and all other (Group C). Table B-16 describes the distribution of cases across hospital groups.

Cases in the three groups were compared on three key variables: length of stay (LOS), total operating costs, and the difference between payments and costs. The number of cases listing

Table B–16. Distribution of MDC 4 Cases By Hospital Group

Hospital Group	Group A	Group B	Group C
Total	8182	3108	787477
Urban	6862	2406	544756
Rural	1320	702	242721
Non-Teaching	4164	1708	532454
Minor Teaching	3217	908	214067
Major Teaching	783	403	38125

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Table B–17. Average Length of Stay (MDC 4 Cases)

Hospital Group	Group A	Group B	Group C
Group Average	42.4	12.8	8.7
Urban	43.4	13.1	9.2
Rural	37.6	11.5	7.6
Non-Teaching	39.2	12.5	8.3
Minor Teaching	45.8	13.6	9.7
Major Teaching	45.5	11.9	9.4

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Table B–18. Mean Total Operating Costs (MDC 4 Cases)

Hospital Group	Group A	Group B	Group C
Group Average	$34500	$9800	$3900
Urban	36000	10400	4300
Rural	25200	7500	2800
Non-Teaching	31300	9200	3500
Minor Teaching	37000	10700	4500
Major Teaching	41200	11100	5300

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Table B–19. Payments Minus Costs: Mean Differences (MDC 4 Cases)

Hospital Group	Group A	Group B	Group C
Group Average	$4400	$640	$10
Urban	4600	800	20
Rural	3100	90	90
Non-Teaching	4100	300	30
Minor Teaching	3200	430	150
Major Teaching	11800	3100	800

SOURCE: ProPAC analysis of 1986 MEDPAR data.

respiratory failure as the principal or secondary diagnosis was also determined.

Length of Stay—Table B-17 shows the LOS for the three groups. The LOS for tracheostomy cases was 3.3 times higher than for mechanical ventilation cases, and almost five times greater than for all other cases. The LOS for mechanical ventilation cases was 1.5 greater than for all other cases.

Total Operating Costs—Total operating costs, displayed in Table B-18, were 3.5 times greater for tracheostomy cases than for mechanical ventilation cases, and nine times higher than for all other cases. Costs for mechanical ventilation cases were about 2.5 times greater than for all other cases.

Payments Minus Costs—Payments were much higher than costs for tracheostomy cases as shown in Table B-19. Payments were higher than costs for mechanical ventilation cases, although not of the magnitude for tracheostomy cases.

Other MDC Analysis—Similar analysis was conducted for a sample of DRGs outside of MDC 4: DRG 14 (Specific Cerebrovascular Disorders Except Transient Ischemic Attack) and DRGs 18-19 (Cranial and Peripheral Nerve Disorders) from MDC 1; DRG 121-125 (Acute Myocardial Infarction) and DRG 127 (Heart Failure and Shock) from MDC 5; DRG 449-450 (Poisoning and Toxic Effects of Drugs) from MDC 21; and DRG 457 and DRG 472 (Extensive Burns) from MDC 22.

Three subgroups of cases were studied, as in the MDC 4 analysis: tracheostomy cases (Group D), intubation and mechanical ventilation cases (Group E), and all other cases (Group F). Table B-20 describes the distribution of cases across hospital groups.

Length of Stay—Table B-21 shows the LOS for the three groups. The LOS for tracheostomy cases was about five times greater than the other groups. The difference between mechanical ventilation

Table B-20. Distribution of Non-MDC 4 Cases By Hospital Group

Hospital Group	Group D	Group E	Group F
Total	1641	2142	850881
Urban	1422	1656	646374
Rural	219	486	204507
Non-Teaching	765	1201	499851
Minor Teaching	669	636	288761
Major Teaching	203	292	59964

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Table B-22. Mean Total Operating Costs (Non-MDC 4 Cases)

Hospital Group	Group D	Group E	Group F
Group Average	$33000	$7000	$4100
Urban	34200	7400	4400
Rural	23500	5000	3100
Non- Teaching	28700	6500	3800
Minor Teaching	34500	7400	4400
Major Teaching	47700	8650	5500

SOURCE: ProPAC analysis of 1986 MEDPAR data.

cases and all other cases was much smaller than in the analysis of cases from MDC 4.

Total Operating Costs—As shown in Table B-22, total operating costs for tracheostomy cases were five times greater than for mechanical ventilation cases, and eight times greater than all other cases. Mechanical ventilation cases had operating costs that were 1.7 times higher than for all other cases, a lower ratio than in the MDC 4 analysis.

Payments Minus Costs—The difference between payments and costs for all groups was negative, as shown in Table B-23. The higher payment weight for tracheostomy and mechanical ventilation cases did not affect payments for cases outside of MDC 4. The average difference for tracheostomy cases was extremely negative when compared to the other groups. The average difference for mechanical ventilation cases was seven times more negative than for all other cases.

Conclusions—The new DRGs appear to resolve payment inadequacies for mechanical ventilation cases. In fact, payments were considerably higher than costs for tracheostomy cases (Group A) and intubation and mechanical ventilation cases (Group B) when compared to all other cases. The data suggest there may be a financial incentive to assign cases to DRG 474 (Group A) and DRG 475 (Group B). This could occur either through more strict coding practices or through an increase in use of tracheostomy, intubation, and mechanical ventilation. The Commission is concerned about both circumstances, particularly the potential for increased use of ventilatory support procedures.

Payment inadequacies for mechanical ventilation continue for cases outside of MDC 4, although the inadequacies do not appear to be as great. Only 0.4 percent of the cases from DRGs outside MDC 4 used ventilatory support, compared to 1.4 percent of the cases from DRGs in MDC 4. The small number of cases may be the result of two factors: (1) biased selection of non-MDC 4 DRGs in this analysis, and (2) absence of an incentive to code ventilatory support procedures for cases in these DRGs. Until more complete data on the number of

Table B-21. Average Length of Stay (Non-MDC 4 Cases)

Hospital Group	Group D	Group E	Group F
Group Average	43.9	9.1	8.6
Urban	44.6	9.4	8.8
Rural	39.3	8.0	8.1
Non-Teaching	39.7	8.7	8.4
Minor Teaching	44.4	9.7	8.9
Major Teaching	57.8	9.1	9.2

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Table B-23. Payments Minus Costs: Mean Differences (Non-MDC 4 Cases)

Hospital Group	Group D	Group E	Group F
Group Average	-$28900	-$2416	-$330
Urban	-29900	-2600	-390
Rural	-20200	-1700	-140
Non Teaching	-24800	-2300	-240
Minor Teaching	-30200	-2600	-480
Major Teaching	-41700	-2700	-380

SOURCE: ProPAC analysis of 1986 MEDPAR data.

mechanical ventilation cases outside of MDC 4 are available, it does not appear feasible to assign mechanical ventilation cases from other MDCs to DRG 474 and DRG 475.

The potential for adverse use of ventilatory support procedures provides evidence for classifying mechanical ventilation patients based on diagnostic rather than procedural information. Availability of a legitimate respiratory failure code will likely increase the use of respiratory failure as the principal diagnosis. The Commission will monitor payments under these new DRGs to ensure they are appropriate. In addition, the Secretary should monitor practice patterns for inappropriate use of tracheostomy, intubation, and mechanical ventilation.

Acquired Immune Deficiency Syndrome

ProPAC began work related to Acquired Immune Deficiency Syndrome (AIDS) that will continue into the coming year. This year's work centered on two topics. One was the expected effect of AIDS and AIDS-related disease on the rate of hospitalization for Medicare beneficiaries. The other was a study of the adequacy of DRG payments for Medicare patients with AIDS and AIDS-related disease.

Expected Hospital Resource Needs—Only about one to three percent of AIDS inpatient admissions are Medicare beneficiaries. No major changes in the distribution of cases among AIDS risk groups are expected in the next five years. Therefore, Medicare beneficiaries should continue to comprise a small percentage of all patients hospitalized with AIDS.

The HCFA Office of the Actuary estimated that direct costs to Medicare of AIDS patient care will total less than $100 million in 1991. This figure is based on conservative estimates of a cumulative total of about 270,000 AIDS cases by the end of 1991, with more than 74,000 occurring in 1991. This estimate does not take into account the estimated 50,000 to 125,000 patients with AIDS-Related Complex (ARC) whose health care requirements have not been studied thoroughly.

The percentage of Medicare AIDS cases could increase in the future. At present, AIDS patients do not usually survive beyond the 24-month waiting period required to qualify for Medicare disability benefits. Thus, only a very small fraction of AIDS victims are Medicare-eligible under current law. However, drugs under development may extend the life expectancy of AIDS patients. Despite these uncertainties, it is clear that under current eligibility, hospital inpatient costs of AIDS patients in 1991 will comprise a small fraction of the Medicare budget. Legislation has been proposed that would increase eligibility of AIDS patients for disability benefits. ProPAC will monitor the progress of these proposals and collect new information on costs as it becomes available.

Costs of AIDS Cases—ProPAC studied the costs of AIDS cases using 1986 MEDPAR data. Costs were estimated by adjusting patient LOS and charges using hospital-specific per-diems and departmental RCCs.

AIDS cases are distributed among many DRGs. A recent HCFA analysis has shown that the top five DRGs to which AIDS cases are assigned account for only 42 percent of all AIDS cases. Based on HCFA's analysis, five AIDS patient groups were chosen for ProPAC's analysis, as shown in Table B-24. Less than 1,000 cases were identified. Be-

Table B-24. Diagnoses, Number of Cases, and DRGs Studied

Diagnostic Group	Number of Cases	DRGs Studied
AIDS as Principal Diagnosis	222	398-9: Reticuloendothelial and Immunity Disorders
Kaposi's Sarcoma	67	283-4: Minor Skin Disorders
Pneumocystis Pneumonia	612	79-80: Respiratory Infections
Gastroenterological Disorders With Secondary Diagnosis of AIDS	34	182-3: Esophagitis, Gastroenteritis, & Digestive Disorders
Pneumonia with Secondary Diagnosis of AIDS	54	89-90: Simple Pneumonia and Pleurisy

SOURCE: ProPAC analysis of 1986 MEDPAR data.

cause there were no AIDS-specific ICD-9-CM codes in 1986, it is likely that some AIDS cases were not identified.

Cost data for three representative DRGs are presented in Table B-25. AIDS cases are substantially more costly than other cases in the same DRGs. This evidence suggests that payment's may be inadequate. AIDS cases appear to have been relatively dispersed among hospitals, as suggested by the small average numbers of cases per hospital. It is not clear what percentage of the 534 pneumocystis pneumonia cases were AIDS patients. However, for the subset of pneumocystis pneumonia patients for which AIDS was specifically coded, costs were considerably higher.

The largest cost differences were for patients with a principal diagnosis of AIDS. This group probably included many patients with serious opportunistic infections or neurological manifestations of AIDS. It is also likely that this group contained many improperly coded cases that might otherwise have been assigned to higher-weighted DRGs.

A high percentage of AIDS cases were outliers. When outlier cases were eliminated, cost differences were reduced between AIDS cases and the other cases. However, average differences of $600 to $3,600 remained as shown in Table B-26.

Conclusions—Overall, payments for AIDS patients may not be adequate. The fiscal year 1986 data are limited by coding problems, and more analysis is planned using fiscal year 1987 data. Future analyses will include an examination of more DRGs and the distribution of AIDS cases among hospitals. Future analyses will also consider ways of creating more equitable payments. Specific AIDS DRGS, such as those adopted by New York State, may be evaluated for potential use in the Medicare population.

AIDS cases are currently clustered in certain states, such as California and New York, and in

Table B–25. Average Costs Per Case and Average Number of Cases Per Hospital for Selected DRGs In 1986

DRG	Group	Number of Cases	Average Costs	Average Number of Cases per Hospital[a]
398	AIDS Cases	173	$9234	1.2
398	Other Cases in DRG	4942	3676	2.2
283	Kaposi's Sarcoma	46	3630	1.1
283	Other Cases in DRG	6078	2724	2.2
79	Pneumocystis Pneumonia	534	8984	1.3
79	Pneumocystis Pneumonia w/Secondary Diagnosis of AIDS	114	11336	---
79	Other Cases in DRG	72287	6165	13.8

a The ratio of the total number of cases to the total number of hospitals that discharged cases of this type.

SOURCE: ProPAC analysis of 1986 MEDPAR data.

Table B–26. Average Costs in 1986, Inlier Cases Only

Diagnostic Group	Average Cost of AIDS Cases	Other Cases
AIDS as Principal Diagnosis (DRG 398)	$5056	$2987
Kaposi's Sarcoma (DRG 283)	3008	2426
Pneumocystis Pneumonia - with secondary diagnosis of AIDS (DRG 79)	8405	4813

SOURCE: ProPAC analysis of 1986 MEDPAR data.

certain hospital types. Furthermore, some hospitals with the greatest numbers of AIDS cases, particularly public hospitals, may also care for the most costly cases (e.g., IV drug users and those with pneumocystis pneumonia). ProPAC plans to study this problem in the coming year using Medicare data.

Specialty Centers and Units

The Commission conducted several analyses to determine if specialty centers and units are appropriately paid under PPS. As referral institutions, these centers treat many of the most complicated cases in a given DRG. PPS payments are based on the average cost per case in a DRG. Because these centers and units may treat only the most resource-intensive cases in a DRG, the Commission is concerned about the adequacy of PPS payment.

Methodology—The specialty centers and units included in these analyses were: burn, cancer, cystic fibrosis, dermatology, hemophilia, spinal cord injury, trauma, and epilepsy. The analyses provided additional information on specific issues relating to specialty centers. The DRGs and specialty centers and units used in these analyses were selected with the assistance of various specialty associations and medical experts.

Costs were estimated from 1986 MEDPAR LOS and charge data by applying hospital-specific per-diems and departmental RCCs. PPS payments were simulated using fiscal year 1988 rules deflated to 1986 payment levels. This method was used to determine relative differences between costs and payments. These differences do not represent actual dollar differences. The information assisted the Commission in determining where improvements in PPS payment policies could be made.

The following statistics were examined for each DRG: number of discharges, standardized charges, length of stay, total operating costs, and average PPS payment per discharge. Comparisons were drawn between hospitals with specialty centers and units and those without such centers and units for different patient groups. The fiscal year 1988 Grouper was used. A detailed description of these analyses will be published as part of ProPAC's Technical Report Series.

Burn Centers—The Commission has examined burn DRGs during the past two years. In the Technical Appendixes to the April 1986 Report to the Secretary, the Commission discussed its decision not to recommend reclassifying cases in burn DRGs. Instead, the Commission decided to continue analysis regarding outlier payment policy and the distribution of cases among specialty hospitals.

The American Burn Association (ABA) produces a directory of hospitals that provide specialized burn care services. The 1985 directory includes 181 institutions that have units specifically designed for the care of burn patients. It also includes 48 hospitals with specialized burn care services. The 139 hospitals in ProPAC's analysis were selected from the directory. The hospitals are primarily urban, teaching, and disproportionate share.

Table B-27 provides summary information on the five burn DRGs. The majority of burn patients were in DRGs 458-459. Payments to burn centers were consistently lower than costs. Hospitals without specialized burn services, however, had costs that were substantially lower than payments.

For example, 32 percent of the total Medicare discharges in DRG 458 were from burn centers. The average difference between simulated payments and estimated costs was minus $5,385. The remaining 68 percent of the discharges were from hospitals without specialized burn care units. In contrast to the burn centers, simulated payments to other hospitals for DRG 458 were $3,707 greater than estimated costs.

Recommendation—The Commission supports the intent of current legislation temporarily increasing outlier payments for burn DRGs. However, the Commission's preliminary analysis indicates that the increase in outlier payments is appropriate only for those cases treated in specialized burn centers and units. The Commission will examine this topic further and submit additional recommendations to the Congress and the Secretary of Health and Human Services as required by OBRA 1987.

Cancer Centers—The National Cancer Institute classifies cancer centers into three categories: clinical, community, and comprehensive. ProPAC examined each type of center, plus exempt cancer hospitals. The cancer centers were identified by the National Cancer Institute and the Association of

Table B–27. Discharges, Outliers, and Payments Minus Costs for Burn DRGs

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent		
456	Burn Centers	24	13	42	-9762
	Other Hospitals	161	87	7	2866
457	Burn Centers	97	71	14	2597
	Other Hospitals	39	29	21	5405
458	Burn Centers	507	32	25	-5385
	Other Hospitals	1088	68	19	3707
459	Burn Centers	82	9	22	-6051
	Other Hospitals	818	91	12	708
472	Burn Centers	*	*	*	*
	Other Hospitals	*	*	*	*

* This DRG was created in fiscal year 1987. The method used to simulate payments was not appropriate for this DRG.

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

Community Cancer Centers. There were 234 non-exempt cancer centers examined: 15 comprehensive, 15 clinical, and 204 community. These centers are predominately urban and teaching.

Table B-28 provides information on all non-exempt cancer centers compared to other hospitals. In general, PPS payments appear adequate for all DRGs except DRG 473. Non-exempt cancer centers treated 16 percent of DRG 473 discharges. The difference between simulated payments and estimated costs was minus $1,567. The difference for non-cancer hospitals was $2,920.

Table B–28. Discharges, Outliers, and Payments Minus Costs for Cancer DRGs[a]

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent		
172	Cancer Centers	3448	11	8	14
	Other Hosiptals	27011	89	7	161
173	Cancer Centers	1023	13	4	766
	Other Hospitals	7022	87	3	-1
257	Cancer Centers	2433	13	3	65
	Other Hospitals	16722	87	3	-111
262	Cancer Centers	669	11	4	756
	Other Hospitals	5219	89	4	98
274	Cancer Centers	574	12	8	924
	Other Hospitals	4260	88	7	273
400	Cancer Centers	1162	17	14	3821
	Other Hospitals	5776	83	14	1193
410	Cancer Centers	19985	19	2	564
	Other Hospitals	85156	81	2	143
473	Cancer Centers	1199	16	27	-1567
	Other Hospitals	6316	84	19	2920

a Cancer centers combine all non-exempt cancer facilities included in these analyses.

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

Conclusion—Based on these results, the Commission will continue its analyses of cancer centers, particularly for cases assigned to DRG 473.

Cystic Fibrosis (CF) Centers—ProPAC's analysis included 109 of the 126 providers identified as CF centers by the Cystic Fibrosis Foundation. These centers are predominately urban, teaching, and disproportionate share.

The majority of patients with CF are admitted to hospitals for treatment of lung infections. The analysis compared the estimated costs and simulated payments for patients with CF and patients without CF, by treatment location, for the DRGs listed in Table B-29.

Patients with CF had higher costs than other patients in the same DRG, regardless of setting. The costs of treating patients with CF were comparable across hospitals. For example, in DRG 296, CF centers treated 43 percent of the discharges. The difference between simulated payments and estimated costs was minus $4,164. The remaining 57 percent of the discharges were from other hospitals. The difference between simulated payments and estimated costs in these hospitals was minus $5,164.

With the exception of DRG 79, simulated payments for patients with CF were lower than estimated costs. However, payments for patients without CF generally were higher than costs.

Conclusions—The Commission decided not to make a specific recommendation for CF cases because Medicare beneficiaries with CF represent less than 1 percent of the discharges in the DRGs examined. The Commission believes DRG payments are, on average, adequate. The Commission

Table B-29. Discharges, Outliers, and Payments Minus Costs for Selected DRGs with Cystic Fibrosis Cases

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent		
Patients With Cystic Fibrosis					
79	CF Centers	55	34	4	1348
	Other Hospitals	109	66	8	-560
88	CF Centers	26	57	4	-2030
	Other Hospitals	20	43	0	-1826
89	CF Centers	10	28	0	-800
	Other Hospitals	26	72	4	26
96	CF Centers	10	16	0	-2739
	Other Hospitals	53	84	13	-2050
296	CF Centers	47	43	9	-4164
	Other Hospitals	62	57	6	-5164
Patients Without Cystic Fibrosis					
79	CF Centers	1949	3	11	1324
	Other Hospitals	66483	97	9	806
88	CF Centers	3746	2	4	441
	Other Hospitals	148103	98	3	-3
89	CF Centers	5930	2	5	387
	Other Hospitals	233056	98	4	83
96	CF Centers	2989	2	3	478
	Other Hospitals	153696	98	2	20
296	CF Centers	3989	3	5	119
	Other Hospitals	142828	97	4	-92

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

is concerned, however, that the use of Medicare DRGs by other payers may not be appropriate for CF cases.

Dermatology Centers—The Commission examined dermatology DRGs in 1985 and 1986, but made no recommendations. The 60 providers in this analysis were identified by the American Academy of Dermatology. The Academy defines these hospitals as dermatology centers based on the diseases they treat and the treatments they employ. These providers are primarily urban, major teaching, and disproportionate share.

Table B-30 shows simulated payments for the dermatology DRGs were lower than estimated costs at both dermatology centers and other hospitals. For example, dermatology centers treated ten percent of the discharges in DRG 273. The average difference between simulated payments and estimated costs was minus $2,006. The remaining 90 percent of Medicare discharges were treated by other hospitals. On average, payments were $390 less than costs for these cases. When specific dermatology cases within certain DRGs were examined, dermatology centers had higher costs, as shown in Table B-31.

Conclusion—The Commission will continue its analysis of dermatology cases and the payment differences between dermatology centers and other hospitals.

Epilepsy Centers—Two issues regarding the medical and surgical treatment of intractable epilepsy were brought to the Commission's attention in 1987. One was the adequacy of PPS payment for the treatment of intractable epilepsy using intensive neurodiagnostic monitoring. The other was the adequacy of payments based on one surgical procedure when multiple procedures are performed in one hospital admission.

Table B-32 provides information on the DRGs examined. Because intensive neurodiagnostic monitoring is a new treatment, only three hospitals were identified that performed this procedure during fiscal year 1986.

Conclusion—The Commission deferred a decision on this issue until further analyses can be completed.

Hemophilia Centers—The 22 providers in this analysis were identified by the National Hemophilia Foundation based on grants received from the Secretary of HHS under a Maternal and Child Health block grant. The centers are urban, and predominately major teaching and disproportionate share.

Table B-30. Discharges, Outliers, and Payments Minus Costs for Dermatology DRGs

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent		
240	Dermatology Centers	487	4	6	-354
	Other Hospitals	10536	96	5	-193
241	Dermatology Centers	377	5	3	-193
	Other Hospitals	7974	95	2	-231
271	Dermatology Centers	414	2	9	52
	Other Hospitals	17386	98	6	-6
272	Dermatology Centers	489	8	12	-1755
	Other Hospitals	5872	92	5	-33
273	Dermatology Centers	437	10	13	-2006
	Other Hospitals	3731	90	1	-69
283	Dermatology Centers	383	7	5	-779
	Other Hospitals	5389	93	2	-155
284	Dermatology Centers	416	9	4	-914
	Other Hospitals	4146	91	2	-139

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

Table B-31. Discharges, Outliers, and Payments Minus Costs for Selected Cases In Dermatology DRGs

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent		
Psoriasis Cases					
240/241	Dermatology Centers	79	33	16	-1732
	Other Hospitals	160	67	5	123
272/273	Dermatology Centers	537	47	15	-2596
	Other Hospitals	605	53	5	-533
Pemphigus Cases					
272/273	Dermatology Centers	26	15	23	-6564
	Other Hospitals	149	85	9	-903
Pemhigoid Cases					
272/273	Dermatology Centers	91	16	16	-3597
	Other Hospitals	467	84	12	-1510
Malignant Melanoma Cases					
272/273	Dermatology Centers	32	5	9	-14
	Other Hospitals	580	95	3	172
283/284	Dermatology Centers	58	11	7	-1038
	Other Hospitals	484	89	6	-573
Exfoliative Dermatitis Cases					
283/284	Dermatology Centers	67	10	7	-1784
	Other Hospitals	599	90	3	-704

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

Table B-32. Discharges, Outliers, and Payments Minus Costs for Selected DRGs with Epilepsy Cases

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent		
Patients With Epilepsy					
1	Epilepsy Centers	9	15	11	-3536
	Other Hospitals	52	85	6	4722
24	Epilepsy Centers	12	*	17	-1931
	Other Hospitals	6505	99	3	130
25	Epilepsy Centers	28	1	43	-1808
	Other Hospitals	4702	99	2	-257
Patients Without Epilepsy					
1	Epilepsy Centers	151	1	13	972
	Other Hospitals	21777	99	15	1569
24	Epilepsy Centers	26	*	12	-564
	Other Hospitals	33234	99	3	-124
25	Epilepsy Centers	60	*	12	-1613
	Other Hospitals	25556	99	2	-81

* Less than one percent.

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

Table B-33 shows that the difference between simulated payments and estimated costs of treating patients with hemophilia varies regardless of the setting. For instance, hemophilia centers treated three percent of Medicare discharges in DRG 397. Payments were $2,399 less than costs. For other hospitals, payments were greater than costs. However, in DRG 174, payments were less than costs for both groups. No consistent difference, however, was found between payments and costs for non-hemophilia cases in hemophilia centers or other hospitals.

Conclusion—One problem is the additional cost of the clotting factor concentrate required by hemophilia patients. Scientific advances in clotting factor technology could increase the costs of treating patients with hemophilia. Therefore, the Commission will continue to monitor this topic.

Spinal Cord Injury Centers—A hospital can be designated as a spinal cord injury center either by receiving federal funding through a peer review process or accreditation by the Council for Accreditation of Rehabilitation Facilities. The 18 provid-

Table B–33. Discharges, Outliers, and Payments Minus Costs for Selected DRGs with Hemophilia Cases

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent		
Patients With Hemophilia					
174	Hemophilia Centers	13	2	0	-15
	Other Hospitals	830	98	3	-564
182	Hemophilia Centers	6	2	0	326
	Other Hospitals	243	98	2	-690
202	Hemophilia Centers	2	1	50	-7959
	Other Hospitals	259	99	6	-274
209	Hemophilia Centers	8	5	38	-7951
	Other Hospitals	154	95	12	-2286
244	Hemophilia Centers	9	7	0	290
	Other Hospitals	122	93	2	-143
325	Hemophilia Centers	4	3	0	883
	Other Hospitals	142	97	3	175
397	Hemophilia Centers	36	3	11	-2399
	Other Hospitals	1213	97	4	252
Patients Without Hemophilia					
174	Hemophilia Centers	669	1	5	183
	Other Hospitals	108581	99	3	-95
182	Hemophilia Centers	900	*	4	-100
	Other Hospitals	204861	99	3	-152
202	Hemophilia Centers	91	1	9	1105
	Other Hospitals	15154	99	6	100
209	Hemophilia Centers	1352	1	6	945
	Other Hospitals	159842	99	4	160
244	Hemophilia Centers	84	1	4	-326
	Other Hospitals	12557	99	3	-250
325	Hemophilia Centers	83	1	4	317
	Other Hospitals	11627	99	2	-127
397	Hemophilia Centers	72	1	7	-368
	Other Hospitals	8072	99	4	-61

* Less than one percent.

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

ers in this analysis were identified as centers by the Chairman of the Department of Rehabilitation Medicine at the University of Alabama in Birmingham Hospital. The university is the National Spinal Cord Injury Statistical Center. The majority of these centers are urban, major teaching, and disproportionate share.

Table B-34 indicates simulated payments were less than estimated costs for cases treated at spinal cord injury centers. These centers also treated a higher percentage of outlier cases than other hospitals.

Conclusion—Because of the high percent of outlier cases, and the small percent of Medicare discharges in Spinal Cord Injury centers, the Commission deferred a decision pending the possible implementation of a new outlier payment policy. (See Recommendation 18.)

Trauma Centers—The American College of Surgeons accredits level one and level two trauma centers. Level one centers are required to have certain teaching, research, and specialty programs. Level two centers have fewer requirements. Level three centers are designated because they are the only facilities in the area available to treat trauma patients. The 265 providers in this analysis were selected from the Directory of Specialty Care Referral Centers compiled by the American Trauma Society.

Table B-35 provides information on level one and two trauma centers combined and other hospitals. Payments to trauma centers and other hospitals appear adequate in all DRGs except DRG 83.

Experts disagree about the definition of trauma and, therefore, the identification of specific DRGs for analysis. Some define trauma based on the impact of the injury to the patient's system. They include hip and femur fractures (DRGs 209-210) as trauma cases. Others define trauma based on how the injury occurred, or the extent of the injury and whether it requires the specialized services provided at a trauma center.

Conclusion—The Commission will continue its analysis of trauma centers.

CASE-MIX MEASUREMENT AND CODING ISSUES

The Commission continues to believe DRGs are the most appropriate measure of hospital case mix for the Medicare PPS. The DRGs have limitations, however, that cannot be corrected through incremental improvements. This section describes ProPAC's ongoing efforts to identify fundamental improvements in case-mix measurement.

The Commission pursued two activities in this area during the past year. One was a conference of technical experts to assess the development of alternative case-mix systems that could potentially replace or modify the DRG system. The executive summary from the proceedings of the conference is presented first. The full proceedings are available as part of ProPAC's Technical Report Series. The other activity was an evaluation of certain coding rules used to assign diagnostic and procedural codes to patients. The information that supported the Commission's recommendation on this topic is then presented.

Table B-34. Discharges, Outliers, and Payments Minus Costs for Spinal Cord Injury DRGs

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent		
4	SPI Centers	110	3	17	-3983
	Other Hospitals	4171	97	14	1100
9	SPI Centers	39	2	18	-2193
	Other Hospitals	2089	98	9	111

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

Table B–35. Discharges, Outliers, and Payments Minus Costs for Trauma DRGs[a]

DRG	Hospital Type	Discharges		Percent Outliers	Payments Minus Costs
		Number	Percent[b]		
2	Trauma Centers	773	17	16	15253
	Other Hospitals	3670	81	16	7234
27	Trauma Centers	372	16	12	7524
	Other Hospitals	1874	82	9	3016
28	Trauma Centers	551	10	9	1717
	Other Hospitals	5136	89	6	1186
29	Trauma Centers	504	10	4	612
	Other Hospitals	4696	89	2	303
83	Trauma Centers	523	8	3	-2420
	Other Hospitals	5876	91	3	-714
84	Trauma Centers	266	9	1	1193
	Other Hospitals	2552	90	2	132
191	Trauma Centers	29	18	21	17387
	Other Hospitals	130	82	21	4048
392	Trauma Centers	78	17	24	3809
	Other Hospitals	376	83	14	3723
444	Trauma Centers	258	8	5	1267
	Other Hospitals	3047	92	4	214
445	Trauma Centers	248	8	2	469
	Other Hospitals	2993	92	2	146

a Trauma centers combine those considered level 1 or 2.

b Percents will note equal 100 due to the exclusion of level 3 centers.

SOURCE: ProPAC analysis of fiscal year 1986 MEDPAR data.

Current Research on Case-Mix Measurement and Alternative Patient Classification Systems

In the past three years, the Commission has considered three broad approaches to improving the measurement of hospital case mix: (1) retain the DRG system but revise it incrementally as problems emerge; (2) retain the DRG system in principle but reconstruct it using a newer, more complete data base; and (3) implement an alternative system, either in conjunction with or as a replacement for the DRGs.

To date, the Commission has recommended retaining the current system along with several incremental modifications and improvements. The Commission has also expressed its concerns regarding variations in resource use in several DRGs. The Commission recognizes that the DRGs, as a case-mix measurement tool, require periodic adjustments (e.g., creation of new DRGs, changes in existing DRGs, incorporation of new technologies into the DRGs) to assure equitable payments. ProPAC also recognizes that in the long term it may be necessary to consider an alternative patient classification system to replace or modify the DRGs.

Several patient classification systems are in various stages of development, refinement, evaluation, and use. ProPAC's interest in these alternative case-mix measurement systems is longstanding. The Commission believes it is premature to recommend major DRG reconstruction or implementation of one of the alternative systems for Medicare payment. Nevertheless, the Commission continues to monitor the development and evaluation of alternative case-mix measurement systems.

Technical Advisory Conference—On June 23, 1987, the Commission convened a technical advi-

sory conference on case-mix measurement systems. Participants included system developers, researchers, and policy makers knowledgeable in this area. The specific objectives for the meeting were to: assess the current status of the various systems; identify possible roles for ProPAC to play in the evaluation of these systems for potential use under PPS; and provide advice on the Commission's role in addressing outstanding research issues.

Potential Use of Alternative Systems Under PPS—The participants discussed the extent to which systems relying on currently available discharge abstract data can be used to refine case-mix measurement. They also discussed the ability of systems that require additional clinical data elements to achieve more precise refinements to case-mix measurement for payment purposes. They agreed that more research is necessary in both areas.

Alternative case-mix systems were developed to serve several purposes. Some were designed as a quality assurance or monitoring tool. Others were developed to assist clinicians in patient management. The participants agreed that no system meets the multiple objectives of payment refinement, quality assurance monitoring, cost containment, and hospital management. The purposes for which a system is used are important in assessing its performance. The ability of systems to predict resource use, quality of care, or outcomes are all possible dimensions for comparison.

Data Collection Requirements—Data collection requirements and the definition of patient categories using the physiologic-based systems (i.e., MedisGroups, Acute Physiologic and Chronic Health Evaluation (APACHE), and Computerized Severity of Illness) warrant further study. Preliminary studies suggest there is a convergence of the data collection requirements of these systems. One area for further study is to examine their common data elements and definitions. A second area is to evaluate how these data elements are used by the systems.

Technical Adjustments Required to Keep Systems Current—Any case-mix measurement tool requires periodic technical adjustments to assure that the system reflects current technology and medical practice patterns. The status of these systems is constantly changing as they are revised and modified to reflect current medical practices and technology advancement. Other adjustments are made periodically to improve the algorithms for grouping cases.

Data Quality—Concerns about data quality are related to the completeness and quality of medical record documentation. Systems based on ICD-9-CM codes have limitations because these codes may not adequately describe diagnoses and procedures. The abstractor's ability to translate narrative descriptions of diagnoses and procedures into codes is also an issue. Systems relying on clinical data depend on timely and complete documentation of physiological findings and test results.

Data availability can differ by hospital type. For example, medical records in tertiary teaching hospitals often have more detailed documentation because of their teaching programs than non-teaching hospitals. Similarly, test results are more readily available in hospitals with automated hospital information systems than in hospitals relying on manual reporting.

Medical record documentation can affect the accuracy of alternative case-mix systems. Inaccurate or incomplete coding of diagnoses and procedures can produce inaccurate patient classification, especially in systems that rely only on the discharge abstract. Several participants pointed out that the number and the specificity of ICD-9-CM codes have increased since the implementation of PPS. Therefore, studies that use pre-PPS discharge abstract data may result in a high degree of inaccurate patient assignments.

Implementation Costs—The incremental cost of implementing a case-mix measurement system is an important consideration. The need for additional employees for data abstraction is a critical factor affecting cost. The additional time required to review and abstract medical records can also be significant. Systems based on currently available discharge abstract data are less costly to implement than those requiring additional data collection.

Hospitals in Pennsylvania are now required by law to collect MedisGroups data for all hospital inpatients. This provides an opportunity to monitor the costs of implementing a system that requires

additional data collection. Such monitoring efforts could assist the Commission in evaluating the additional cost of data collection on a national scale. The participants recognized the high administrative costs of implementing and evaluating case-mix systems.

Areas for Further Study—There has not yet been a comprehensive evaluation of the available systems using a common data base and set of evaluation criteria. The study by Thomas and Ashcraft presented at the conference is the most comprehensive comparative study to date. However, it did not include the Computerized Severity of Illness Index because it was still under development. In addition, this study included a limited sample of patients and hospitals.

The participants agreed on the need to establish a common, comprehensive data base for use in comparative evaluations. A contract recently awarded by HCFA to the Queens University Hospital in Canada will compare a variety of alternative case-mix measurement systems. This study will develop a data base of 30,000 Medicare discharges from a nationally representative sample of at least 30 U.S. hospitals. Each discharge will be assigned to a category using the following alternative systems: DRGs, MedisGroups, Computerized Severity of Illness, Disease Staging (manual, computerized, and comorbidity versions), Patient Management Categories, and APACHE. The study will evaluate the ability of these systems, individually and in combination, to predict the following outcomes: cost, death, readmission, and complications. The participants recommended the Commission monitor this study closely.

A comprehensive evaluation should include an analysis of the distributional effects of payments across hospital types. The panelists suggested using simulations of hospital payments under different case-mix systems. These simulations will be crucial for evaluating the impact of alternative systems on hospital payments.

There is a need for further research in several other areas. For example, the panelists discussed how changes to the DRGs affect hospital-level and patient-level payment equity. Preliminary studies by ProPAC and HCFA have shown that improvements in DRGs at the patient-level may not have a substantial effect when aggregated to the hospital level. The impact of improvements in case mix should be evaluated at both the patient and the hospital level.

Another issue was the degree to which hospitals respond to changes in patient categories. The panelists agreed that hospitals respond to technical modifications and improvements to the DRGs. Therefore, changes in DRGs that result in improvements at the patient level may be important even if such changes may be less significant at the hospital level. Changes in some DRGs may also be important to assure access to care for high-cost patients who might otherwise receive inadequate care.

There were several areas that remained unresolved. For example, the DRGs are not a good measure of severity of illness. However, the panelists did not agree on which alternative system, if any, could better measure severity of illness. They did agree there are other potential applications for alternative systems. One important area that needs further study is the use of alternative systems for evaluating quality of care. The systems could be used in conjunction with DRGs as an evaluation tool rather than as a method for refining DRGs. The participants identified the need to examine the link between quality of care indicators and payments.

The participants discussed the use of outlier payment policy to address possible payment inequities related to severity of illness. Improvements in the identification and payment of outlier cases could reduce many of the concerns regarding severity of illness. They agreed that this was an important area for further research.

Another issue is the desirability of using treatment variables, such as surgery, to classify patients. The panelists expressed concern about the use of treatment variables because of possible incentives to provide unnecessary treatments. They also discussed the extent to which physiologic variables are objective measures of severity of illness. These variables may be more accurate than diagnostic codes in describing patient conditions. However, physiologic indicators of severity of illness may be difficult to incorporate into a classification system for payment purposes.

ProPAC's Role in Evaluating Alternative Systems—The panelists suggested that ProPAC pursue the following activities in the short term regarding alternative case-mix systems.

Monitoring—The Commission should monitor the ongoing efforts to improve the measurement of hospital case mix. These include the:

- Comparative study of alternative case-mix systems at Queens University;
- Refinement of DRGs in the definition and use of complications and comorbidities; and
- Adoption of MedisGroups in Pennsylvania and in Minneapolis-St. Paul for assessing quality of care.

Incremental Improvements—In its April 1987 Report to the Secretary, the Commission reached several conclusions regarding case-mix measurement. In seeking the advice and guidance of technical experts, the Commission was interested in assessing the applicability of these conclusions in light of current developments. The panelists reaffirmed the conclusions and encouraged ProPAC to continue its ongoing efforts in the area of DRG improvements.

Conclusions—The use of ICD-9-CM codes to describe patient diagnostic characteristics and procedures results in problems in DRG assignment and case-mix measurement. It is unlikely, however, that major improvements can be made in the near future.

Research continues on the possible use of alternative case-mix measurement systems to modify or to replace DRGs. This research is still at an early stage and it is unlikely any of the systems will be ready for use in Medicare payment in the next one to two years.

For the short term, modest but important modifications can be made in the DRGs to improve their case-mix measurement capabilities. There currently is inconclusive evidence regarding the ability of any of the alternative systems using existing discharge abstract data to significantly improve case-mix measurement. Research on refinements to the DRGs is still pending and the extent to which such revisions can improve the current system is unknown.

For the long term, case-mix measurement systems that use data in addition to that currently available from the discharge abstract may show greater promise than DRGs or alternative systems that rely on current discharge abstract data. Additional research evaluating and comparing the systems is warranted to determine how such systems could improve case-mix measurement.

Coding Issues

The Commission's coding recommendation incorporates a number of coding issues. The issues range from problems with specific ICD-9-CM codes to larger concerns with the process by which codes are created and updated.

This section describes several specific coding issues in further detail. The issues are: (a) improving codes for acute myocardial infarction (MI) cases, (b) creating codes for partial joint replacements, (c) timely creation and modification of ICD-9-CM codes, and (d) revision of Chapter 16 codes.

Improving Codes for Acute Myocardial Infarction—ProPAC's analysis of the acute myocardial infarction DRGs (DRGs 121-123) indicated that more than 16 percent of these cases had a length of stay of five days or less, even when transfer cases were excluded. Cardiologists, however, generally recommend a stay of at least seven days, with ten days being a common length of stay for uncomplicated cases.

To better understand this discrepancy between ProPAC's findings and recommended practice, the Commission conducted an informal record review at three local hospitals. The charts of more than 50 short-stay cases were reviewed. Many cases had short stays because of a coding rule. This rule permits patients entering the hospital to be coded as MI cases if they have suffered an MI at any time within the previous eight weeks.

A number of other important coding problems were identified. In some instances, MI codes fail to distinguish true MIs from other conditions. For example, current coding conventions assign the codes for MI to cases involving a diagnosis of

acute ischemia, myocardial ischemia, coronary artery occlusion, fibrillation, or "rule out" MI. ProPAC's work indicates that a substantial number of such cases have not, in fact, suffered an acute MI.

Conclusion—ProPAC supports the ICD-9-CM Coordination and Maintenance Committee's current work in revising the MI codes. These revisions will make it possible to distinguish patients who are experiencing an MI at the time of admission from those who have had an MI at some earlier time within an eight-week period. The Commission believes that MI and related codes warrant revision, and that better codes should result in more appropriate DRG assignment for a large percentage of the short-stay cases currently assigned to the acute MI DRGs. Analysis has shown that short-stay cases substantially reduce the weight for DRG 121 and DRG 122. When all short-stay cases are eliminated from these DRGs, average charges for MI cases increase by $1,225.

Creating Codes for Partial Joint Replacements—There is currently no specific ICD-9-CM code for partial joint replacements. Instead, they are coded as "other repair of knee," and assigned to DRGs 221-222 (Knee Procedures) rather than to DRG 209 (Major Joint Procedures). Preliminary evidence suggests that costs of partial knee replacement are more similar to the costs of cases in DRG 209 than in DRGs 221-222.

ProPAC believes there is a need for a specific code to identify partial knee replacement. This procedure is performed in increasing numbers and warrants a more specific code than "other repair of knee." A specific code would allow more intensive study of the procedure's costs and reconsideration of its current DRG assignment.

Conclusion—ProPAC believes the ICD-9-CM Maintenance and Coordination Committee should establish a specific code for partial knee replacements, as well as for other types of partial joint replacements where no codes currently exist.

Timely Creation and Modification of ICD-9-CM Codes—ProPAC repeats its recommendation for more timely creation and modification of ICD-9-CM codes. These concerns arise from long delays in the availability of codes for important new technologies such as percutaneous transluminal angioplasty, total parenteral nutrition, pacemakers, and electrophysiologic studies of the heart. Absence of codes delays collection of information concerning the cost and use of important new technologies. This can interfere with analysis of appropriate DRG assignment.

Conclusion—ProPAC views the absence of codes for new technologies as a serious impediment to timely decision-making about payments during the critical period of early diffusion and use.

Revision of Chapter 16 Codes—Chapter 16 of the ICD-9-CM coding manual contains a variety of symptoms, signs, and ill-defined conditions such as coma, convulsions, malaise, and chest pain. Coding rules generally prohibit the use of codes from Chapter 16 as principal diagnoses. These rules are open to wide interpretation. They have contributed to DRG assignment problems for patients with conditions such as urinary retention secondary to benign prostatic hypertrophy and respiratory failure secondary to chronic obstructive pulmonary disease. These problems were discussed in ProPAC's 1987 April Report to the Secretary. No action has been taken to deal with the many problems posed by Chapter 16 codes and rules. ProPAC feels this issue deserves serious attention.

Conclusion—The Commission recommends the Secretary review Chapter 16 to establish consistent coding rules and guidelines and to help assure more appropriate DRG assignment.

Recommendation—The Secretary should formalize a more timely, systematic and consultative approach to considering ICD-9-CM codes for new diagnoses, procedures, devices, and other treatments. When new codes are considered and created, both coding and clinical specialists should be involved. The Commission continues to support its previous recommendations that the Secretary review Chapter 16 codes and coding procedures.

OUTLIER PAYMENTS

PPS operates on an averaging principle in which payment is based on the cost of a typical case within a DRG. Many cases, however, cost far more than the average and thus are atypical. Outlier policy provides additional payments for such cases.

Cases are defined as atypical either because a patient's costs are extraordinarily high (cost outliers) or because the patient has an extremely long length of stay (day outliers). For cases that qualify as both cost and day outliers (dual outliers), PPS gives precedence to day outlier status. These cases are paid as day outliers, but are identified separately in ProPAC's analyses.

In fiscal year 1984, HCFA set outlier thresholds so that about 85 percent of outlier payments would be for day outliers and about 15 percent would be for cost outliers. HCFA reasoned that length of stay was a more reliable and consistent measure of resource use than costs estimated from charges. In addition, HCFA believed paying a greater portion of outlier payments for high-cost outliers would reward relatively inefficient hospitals.

The PPS statute requires HCFA to set a target for outlier payments (i.e., an outlier pool size) of five to six percent of total PPS payments. The fiscal year 1988 target is five percent. The actual proportion of payments for outliers may be more or less than the targeted amount, depending on the number of outlier cases that actually occur. Different contributions are made to the outlier pool by reducing the standardized payment amounts of urban and rural hospitals to account for different expected outlier payments. Fiscal year 1988 standardized amounts for rural hospitals are reduced by 2.5 percent; for urban hospitals, by 5.6 percent.

The thresholds for day and cost outliers are based on the five percent outlier pool. The day outlier threshold is 18 days or twice the standard deviation of the DRG-specific average length of stay, whichever is lower. The cost outlier threshold is $14,000 or twice the federal DRG rate, whichever is higher. The cost outlier thresholds are applied to costs estimated from charges. These are calculated by multiplying charges adjusted for teaching and disproportionate share times a national ratio of costs to charges (RCC) of 66 percent. Cost outlier payments are derived by multiplying a marginal cost factor of 60 percent times the difference between estimated costs and the threshold amount. Day outlier payments are computed by multiplying 60 percent times the adjusted federal DRG per diem rate times the number of days above the threshold.

Table B-36 summarizes the major features of outlier policy for the current and previous fiscal years. During the five years of PPS these features have remained fairly constant. The thresholds for

Table B-36. Fiscal Year 1984–1988 Outlier Policy Parameters

	1984	1985	1986[a]	1987	1988
Pool Target	5.7% (1.4%)[b]	5.0%	5.0%	5.4% (urban) 2.2% (rural)	5.6% (urban) 2.5% (rural)
Federal Portion	25.0%[b]	50.0%	55.0%	75.0%	100.0%
Length of stay thresholds	Lesser of 20 days or 1.94 x S.D.	Lesser of 22 days or 1.94 x S.D.	Lesser of 17 days or 1.94 x S.D.	Lesser of 17 days or 1.94 x S.D.	Lesser of 18 days or 2.00 x S.D.
Cost Thresholds	Greater of 1.5 x DRG Federal rate or $12,000	Greater of 2.0 x DRG Federal rate or $13,000	Greater of 2.0 x DRG Federal rate or $13,500	Greater of 2.0 x DRG Federal rate or $13,500	Greater of 2.0 x DRG Federal rate or $14,000
Cost-to-charge ratio used for cost outliers	72.0%	72.0%	72.0%	66.0%	66.0%
Marginal cost factor	60.0%	60.0%	60.0%	60.0%	60.0%

a The outlier policy for fiscal year 1986 was effective May 1, 1986.

b For PPS discharges between October 1, 1983 and February 2, 1984, outlier payments were anticipated to be approximately 5.7 percent of total basic PPS payments. Outlier payments applied to both the hospital-specific and the Federal portion of the payment during that period. For PPS discharges between February 3, 1984 and September 20, 1984, outlier payments were anticipated to be approximately 1.4 percent of total anticipated PPS payments (25 percent of 5.7 percent). After February 2, 1984, hospitals only received outlier payments on the Federal portion of their prospective payment.

SOURCE: ProPAC.

day outliers have fluctuated because of reductions in hospital length of stay. The thresholds for cost outliers have gradually increased over time. This reflects adjustments to the standardized amounts for the annual PPS update factor and changes in hospital costs. The RCC used to estimate costs from charges was initially 72 percent, but now is 66 percent (71 percent if capital is included). The only policy feature that has remained constant is the marginal cost factor used to compute both cost and day outlier payments.

ProPAC's review of outlier payment policy included an overview analysis and a simulation of the effect of several alternative policy options. The overview analysis examined outlier payments by hospital group, by DRG, and by outlier type. The simulation study examined two aspects of outlier policy: (1) using a hospital-specific rather than a national RCC to calculate cost outlier payments, and (2) shifting the emphasis from length of stay to cost outliers.

Analytic Methods

The overview analysis provided information about fiscal year 1988 policy. Outlier payments were estimated using fiscal year 1988 DRGs and payment rules applied to fiscal year 1986 MEDPAR data. Payments were estimated using fully national rates. The analysis documented the differences in outlier payments and cases across hospital groups and DRGs by outlier type. In addition, hospital-specific RCCs across and within hospital groups were examined to determine their variation from the national average.

The simulations examined the effect of alternative options to current outlier payment policy. Fiscal year 1986 costs were estimated from LOS and charges using hospital-specific per-diems and departmental RCCs. The fiscal year 1988 Grouper and payment rules were used to assign DRGs and to compute payments. Payments were adjusted to fiscal year 1986 levels for comparison with fiscal year 1986 costs. For all options, the difference between payments and costs was calculated for each patient. These payment differences were used to estimate relative gains and losses for groups of hospitals under each option. They are not estimates of actual gains and losses.

The distribution of losses and gains under various options was examined at both the patient and hospital level. Results are displayed for the patient level only, because the effects at the hospital level were not significant. The results show the reduction in average losses under a particular outlier policy option compared to other options. They also show the change in the proportion of cases with extraordinary losses, as defined below, under the various outlier options.

The following outlier policy options were examined:

- No outlier policy;
- Current fiscal year 1988 rules;
- Use of hospital-specific RCCs with current fiscal year 1988 rules; and
- Changing precedence (i.e., changing emphasis from day to cost outliers).

Three precedence options were considered, each using hospital-specific RCCs. The first option (greater-of option) maintains dual outliers but pays the greater of day or cost outlier amounts. The second option (cost-precedence option) maintains dual outliers but gives precedence to cost outliers. The third option (cost-only option) pays for cost outliers only.

The primary data source was a 20 percent sample of cases from the fiscal year 1986 MEDPAR file. Hospital-level information was obtained from the Medicare Cost Report file and ProPAC's PPS payment model.

The following hospital groups were examined: all hospitals combined, teaching (major and other combined), non-teaching, urban, and rural. The waivered states, New Jersey and Maryland, were excluded from the analyses.

Payment differences were also examined for a subset of 25 "risky" DRGs. Risky DRGs were defined as DRGs with the highest cost variability and the largest volume of cases. These DRGs have a high proportion of outliers and higher average outlier losses than other DRGs. They account for

about 45 percent of outlier payments under current policy.

Table B-37 displays the definitions of extraordinary losses used in ProPAC's analysis. The first and fifth percentile of payment differences are shown for all cases under current policy for each hospital group. One percent of all cases had losses greater than $11,300. Five percent had losses greater than $4,700. Extraordinary losses were defined as losses exceeding either of these percentiles.

Table B-37. Percentile Distribution of Difference Between Payments and Costs under Current Policy, by Hospital Type

Hospital Type	Percentiles 1st	5th
All	-$11300	-$4700
Urban	-12400	-5200
Rural	-7300	-3300
Teaching	-14100	-5600
Non-teaching	-9500	-4100

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to a 20 percent sample of the fiscal year 1986 MEDPAR data.

Findings

The overview analysis confirms the results of a similar study published in ProPAC's Technical Appendixes to the April 1987 Report to the Secretary. That study showed outlier cases and payments are unevenly distributed across hospital groups and DRGs. Similar results from this year's analysis are shown in Tables B-38 through B-41. While these data are not forecasts for any particular year, they provide a reasonable representation of the current distribution of outlier cases and payments under a fully implemented system.

Distribution of Outlier Payments—Information on total outlier payments by hospital group as a fraction of all PPS payments appears in Table B-38. Outlier payments are unevenly distributed among various types of hospitals and across geographic areas. Urban hospitals and large hospitals tend to have a higher proportion of outlier payments than rural hospitals and small hospitals. Teaching hospitals and disproportionate share hospitals also have a relatively large percentage of outlier payments. New England and Middle Atlantic hospitals have a higher percentage of outlier payments than hospitals in other regions. Hospitals in the West North Central, West South Central, and the Mountain Census regions have a relatively small percentage of outlier payments.

Table B-39 shows that only eight percent of outlier payments (0.5 percent of total PPS payments) are for cost outliers. The other 92 percent of outlier payments are for day outliers, including dual outliers. These findings reflect the current emphasis on length-of-stay precedence in outlier payment. In most hospital groups, day-only outliers are three to four times more frequent than cost outliers and about twice as frequent as dual outliers. In the Mountain and Pacific Census regions and proprietary hospitals, outliers are distributed almost equally among the three outlier types.

The percentage of outlier payments for cost outliers varies greatly by hospital group. For example, in the New England and Middle Atlantic Census regions, cost outlier payments are one to two percent of total outlier payments, whereas in the Mountain and Pacific Census regions they are 20 or more percent. Payments for dual outliers, however, are a relatively constant percentage of outlier payments.

Systematic differences across hospital groups may reflect variations in patient mix or in practice patterns. For example, because teaching hospitals are likely to treat more severely ill patients, they have more cases that qualify as outliers than nonteaching hospitals. Historical trends in length of stay may also explain the variation in outlier cases. For example, cost outliers account for four percent of outlier cases in New England, but 28 percent in the Pacific Census region.

Despite differences in outlier payment shares across hospital groups, it is not apparent which groups are at greater risk of serious financial loss because of outliers. Small rural hospitals, for example, may have a relatively low proportion of

Table B–38. Outlier Payments as a Percentage of Total PPS Payments

Hospital Group	Total	Cost	Day-only	Dual
Total	5.7%	0.5%	2.6%	2.6%
New England	9.0	0.1	5.5	3.4
Middle Atlantic	11.0	0.2	6.8	4.1
South Atlantic	5.8	0.7	1.9	3.2
East North Central	4.3	0.3	1.7	2.4
East South Central	4.2	0.6	1.5	2.2
West North Central	3.3	0.4	1.3	1.7
West South Central	3.5	0.6	1.1	1.8
Mountain	3.2	0.8	0.7	1.7
Pacific	3.7	0.7	1.1	1.9
Rural	3.5	0.5	1.6	1.4
Urban	6.1	0.5	2.8	2.8
Urban <100 Beds	3.4	0.6	1.7	1.1
Urban 100-249 Beds	5.1	0.6	2.2	2.2
Urban 250-404 Beds	5.7	0.4	2.5	2.8
Urban 405-684 Beds	6.9	0.4	3.2	3.3
Urban 685+ Beds	8.7	0.2	4.4	4.1
Rural <50 Beds	1.3	0.1	0.8	0.3
Rural 50-99 Beds	2.0	0.4	0.9	0.7
Rural 100-169 Beds	2.9	0.5	1.3	1.1
Rural 170+ Beds	6.1	0.5	2.7	2.8
Non-teaching	4.3	0.6	1.9	1.9
Minor Teaching	6.5	0.3	3.1	3.1
Major Teaching	8.8	0.2	4.5	4.1
Disproportionate Share - Urban MSA > 1M	8.3	0.4	3.9	3.9
Disproportionate Share - Other Urban	6.5	0.4	3.5	2.6
Disproportionate Share - Rural	8.3	2.2	3.0	3.0
Non-Disproportionate Share	4.7	0.5	2.0	2.2
Urban MSA > 1M	6.6	0.5	3.0	3.2
Other Urban	5.5	0.4	2.6	2.4
Sole Community Provider	0.5	0.1	0.2	0.2
Rural Referral Center	3.8	0.3	1.5	1.9
Sole Community Provider & Rural Referral Center	0.7	0.1	0.2	0.4
Other Rural	3.7	0.6	1.8	1.4
Voluntary	5.8	0.3	2.8	2.7
Proprietary	5.3	1.6	1.3	2.4
Urban Government	5.8	0.3	2.8	2.7
Rural Government	3.5	0.4	1.7	1.4

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to the fiscal year 1986 MEDPAR data.

outlier cases, but a few cases may cause major losses to such hospitals.

Table B-40 displays summary information for all outlier types—cost, day-only, and dual. An estimated 3.6 percent of total PPS cases are outliers under fiscal year 1988 rules; 86 percent of these are day outliers. Thirty percent of day outliers are dual outliers.

Average losses are greatest for dual outliers and smallest for day-only outliers. Dual outliers have

Table B-39. Distribution of Outlier Payments and Cases across Outlier Types, by Hospital Type

Hospital Groups	Payments			Cases		
	Cost	Day-only	Dual	Cost	Day-only	Dual
Total	8%	46%	46%	14%	60%	26%
New England	1	61	38	4	78	18
Middle Atlantic	2	61	37	4	78	18
South Atlantic	12	33	55	18	52	30
East North Central	6	39	54	10	63	27
East South Central	13	35	52	17	56	27
West North Central	11	38	50	16	58	26
West South Central	18	32	50	22	50	29
Mountain	24	22	54	29	40	31
Pacific	20	29	51	28	39	32
Rural	13	46	41	18	60	23
Urban	7	46	47	13	61	26
Urban <100 Beds	18	49	33	23	57	20
Urban 100-249 Beds	12	44	44	18	55	27
Urban 250-404 Beds	8	44	48	14	59	27
Urban 405-684 Beds	6	47	48	11	63	26
Urban 685+ Beds	2	51	47	6	71	23
Rural <50 Beds	10	66	24	13	74	13
Rural 50-99 Beds	19	47	34	22	58	20
Rural 100-169 Beds	18	43	39	21	56	23
Rural 170+ Beds	9	45	46	14	61	25
Non-teaching	13	43	44	19	56	26
Minor Teaching	5	47	48	10	64	26
Major Teaching	2	51	46	6	71	23
Disproportionate Share - Urban MSA > 1M	5	47	47	12	61	27
Disproportionate Share - Other Urban	5	54	41	11	66	23
Disproportionate Share - Rural	27	37	36	25	54	21
Non-Disproportionate Share	10	43	47	15	59	26
Urban MSA > 1M	8	45	48	14	59	27
Other Urban	7	48	45	13	63	25
Sole Community Provider	19	43	38	21	58	21
Rural Referral Center	8	40	52	14	60	27
Sole Community Provider & Rural Referral Center	16	31	54	18	55	27
Other Rural	15	49	36	19	60	21
Voluntary	6	48	47	11	64	25
Proprietary	31	24	45	36	33	31
Urban Government	6	48	46	12	63	25
Rural Government	12	47	41	15	63	21

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to the fiscal year 1986 MEDPAR data.

Table B-40. Summary Statistics by Outlier Type

	All	Cost	Day-only[b]	Dual[c]
Percent of PPS Cases	3.6%	0.5%	2.2%	0.9%
Mean Charge	$26620	$34790	$25290	$48220
Mean Cost	$18250	$19220	$18090	$30880
Average Total Payment[a]	$11130	$9670	$11370	$16480
Average Outlier Payment	$5480	$3110	$4160	$9860
Average Loss	-$7120	-$9550	-$6720	-$14400
Mean LOS	36	20	38	49
Mean Special Care Days	6	10	5	12

a Represents the average total payment for outlier cases, including the inlier portion of the payment.

b The current law definition of length of stay outliers includes both day-only and dual outliers (those cases that qualify as both day and cost outliers).

c Dual outliers are paid as day outliers.

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to the fiscal year 1986 MEDPAR data.

more special care days and longer lengths of stay than other outliers. The proportion of special care days, however, is highest for cost outliers.

Incidence of Outliers—Variation in outlier incidence across the DRGs is shown in Table B-41. The average percentage of outlier cases across all DRGs is five percent; the average across all cases is 3.6 percent. Outlier cases account for less than four percent of all cases in two-thirds of the DRGs. Almost ten percent of the DRGs have more than ten percent of their cases qualifying as outliers. Eight DRGs have more than 20 percent outliers, but six are low-volume DRGs, having less than 50 cases.

Overall, 62 percent of all outliers are in ten percent of the DRGs. The distribution of payments is similar. Sixty-seven percent of outlier payments are concentrated in ten percent of the DRGs.

Hospital-Specific Cost-To-Charge Ratios—Under current policy, cases qualify as cost outliers when their costs exceed $14,000 or two times the Federal DRG rate, whichever is greater. Costs are estimated using a national RCC to adjust total charges. Currently, a national RCC of 66 percent is used. Concern has been expressed, however, that using a national RCC is not equitable because of considerable variation in hospital RCCs.

An alternative to current policy is to use hospital-specific RCCs. With the current emphasis on payment for day outliers, the distributional consequences of moving from a national RCC to hospital-specific RCCs would be small. However, use of a national RCC combined with changing precedence from day to cost outliers would result

Table B-41. Distribution of DRGs by Outlier Incidence Rate

Outlier Incidence Rate[a]	Percent of DRGs
0% - 2%	38.7[b]
2% - 4%	28.6
4% - 6%	12.0
6% - 8%	6.1
8% - 10%	4.8
10% - 12%	4.2
12% - 14%	2.1
14% - 16%	0.8
16% - 18%	0.8
18% - 20%	0.0
> 20%	1.7
Summary Statistics	
Average incidence across DRGs	5.0%
Median incidence across DRGs	2.5%
Average incidence across all cases	3.6%

a Expressed as the percentage of outlier cases within the DRG.

b Includes 2.1% of DRGs with no PPS cases and 6.5% of DRGs with no outlier cases.

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to the fiscal year 1986 MEDPAR data.

in a significant shift in payments to hospitals with low RCCs. Therefore, if greater emphasis is placed on cost outliers, costs should be derived by using hospital-specific RCCs to avoid payment inequities.

ProPAC examined the distribution of hospital RCCs within hospital groups. Table B-42 shows the average RCC for all hospitals and for each hospital group. The distribution of RCCs around the average is also displayed. These group averages were derived from hospital-level RCCs computed using patient-level data.

Hospital-specific RCCs vary across geographic regions, as well as by urban and rural status. Small hospitals, both urban and rural, have larger RCCs than larger hospitals in both categories. Non-disproportionate share hospitals have larger RCCs

Table B-42. Percentage of Hospitals With RCCs of Various Levels

Hospital Type	Group Mean	Number of Hospitals	RCC Levels						
			< 0.53	0.54-0.63	0.64-0.73	0.74-0.83	0.84-0.93	0.94-1.03	>1.04
All Hospitals	0.785	5472	5.5	14.4	25.3	24.5	15.3	7.1	7.9
New England	0.789	231	0.9	3.9	24.2	42.0	22.5	3.9	2.6
Middle Atlantic	0.739	522	6.7	12.8	29.1	30.8	14.6	4.4	1.5
South Atlantic	0.722	799	8.0	21.5	31.9	19.8	11.6	3.5	3.6
East North Central	0.807	865	2.7	8.1	21.4	28.3	23.0	11.0	5.5
East South Central	0.712	433	1.6	26.1	32.6	19.6	6.4	4.6	8.3
West North Central	0.876	748	0.8	5.5	15.6	27.5	21.8	13.5	15.2
West South Central	0.814	806	6.8	14.0	25.7	20.0	13.6	7.7	12.2
Mountain	0.860	350	4.9	10.3	20.6	26.3	13.4	8.0	16.6
Pacific	0.745	678	9.4	22.7	27.7	18.7	10.2	3.1	8.1
Rural	0.840	2561	3.1	10.2	22.9	23.7	17.8	9.5	12.8
Urban	0.737	2911	7.7	18.1	27.3	25.1	13.2	5.0	3.6
Urban MSA > 1M	0.721	1487	10.0	20.3	28.6	21.7	11.4	4.3	3.6
Other Urban	0.754	1424	5.3	15.7	26.0	28.6	15.0	5.8	3.6
Rural Referral	0.735	128	3.1	11.7	40.6	29.7	10.9	3.1	0.8
Other Rural	0.840	2130	3.2	10.0	22.6	23.4	22.8	9.9	4.5
Sole Community	0.893	289	2.1	10.4	16.6	24.6	18.3	9.3	18.7
Major Teaching	0.717	168	12.5	14.9	30.4	24.4	13.1	3.6	1.2
Other Teaching	0.728	846	6.3	18.6	29.1	28.6	12.1	3.5	1.9
Non-teaching	0.799	4458	5.1	13.6	24.3	23.7	16.0	7.9	9.3
Rural <50 Beds	0.945	1187	1.3	6.0	13.8	20.0	19.4	15.2	24.3
Rural 50-99 Beds	0.773	784	4.1	12.0	26.4	26.8	19.5	6.5	4.7
Rural 100-169 Beds	0.718	396	5.3	16.9	36.4	26.3	13.1	1.5	0.5
Rural 170+ Beds	0.723	194	5.2	14.9	36.6	29.4	10.3	2.6	1.0
Urban <100 Beds	0.804	703	5.4	15.1	20.2	22.6	17.4	9.1	10.2
Urban 100-249 Beds	0.713	1126	10.6	19.5	27.6	23.8	12.3	4.2	2.0
Urban 250-404 Beds	0.716	654	7.5	18.0	32.1	28.1	9.0	3.8	1.4
Urban 405-684 Beds	0.719	355	4.8	20.6	31.3	25.4	14.9	2.8	0.3
Urban 685+ Beds	0.740	73	1.4	12.3	30.1	39.7	15.1	1.4	0.0
DSH Urban MSA >1M	0.663	498	15.5	27.5	28.3	19.5	6.6	2.2	0.4
DSH Other Urban	0.731	474	5.9	19.0	28.5	29.7	10.3	4.6	1.9
DSH Rural	0.762	223	9.0	14.8	29.1	21.5	11.7	6.7	7.2
NonDSH	0.807	4277	4.2	12.3	24.3	24.6	17.1	8.0	9.5
Proprietary	0.695	827	19.8	24.9	22.2	15.6	7.6	4.1	5.7
Rural Government	0.890	1119	1.3	8.5	20.6	21.5	17.8	12.4	17.9
Urban Government	0.767	424	5.2	14.6	26.4	25.9	16.5	5.9	5.4
Voluntary	0.774	3074	3.3	13.6	27.6	27.7	16.3	6.1	5.3

SOURCE: ProPAC calculations using fiscal year 1986 MEDPAR data and PPS2 Medicare Cost Reports.

Table B–43. Mean Payment Difference[a] for All PPS Cases under Current Policy Using a National and Hospital–Specific RCCs, by Hospital Type, For All DRGs

Hospital Type	National RCC		Hospital-specific RCCs	
	All Cases	Outliers	All Cases	Outliers
All	$70	-$7000	$70	-$7200
Urban	115	-7100	115	-7290
Rural	-65	-6380	-65	-6550
Teaching	160	-7250	165	-7390
Non-teaching	15	-6750	15	-6990
Pool Size		5.8%		5.8%[b]

a Mean dollar difference between payments and costs.

b The pool size increased slightly (not detectable after rounding) when using hospital-specific RCCs. This partially accounts for the small average increase in the payment difference for outlier cases.

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to a 20 percent sample of the fiscal year 1986 MEDPAR data.

than disproportionate share hospitals, while proprietary hospitals have the lowest RCCs when compared to government and voluntary hospitals.

The average hospital-weighted RCC is about 79 percent. The case-weighted average is 72 percent. For some hospital groups, there is a significant percentage of hospitals with large RCCs that would benefit from the use of hospital-specific RCCs.

The results of the simulation using hospital-specific RCCs are shown in Tables B-43 through B-46. Table B-43 displays the mean payment difference for all PPS cases and for outlier cases under current policy with a national RCC and with hospital-specific RCCs. Mean differences are similar using either method to convert charges to costs. This was expected because current policy emphasizes day outliers, whose payments are not based on RCCs.

Table B-44 shows the results for a policy of cost-only outliers are also similar using a national RCC or hospital-specific RCCs. The small differences would decrease further if the outlier payment pool sizes were the same.

Table B-45 shows the percentage of extraordinary losses under current policy using a national RCC and hospital-specific RCCs. The differences are slight because of the predominance of day outliers. Table B-46 displays the same information for a policy of cost-only outliers. Again, the differences are slight.

Table B–44. Mean Payment Differences[a] for Outlier Cases under the Cost–only Option Using Two RCC Alternatives

Hospital Type	National RCC	Hospital-specific RCCs
All DRGs		
All	-$6420	-$6310
Urban	-6430	-6320
Rural	-6350	-6200
Teaching	-7430	-6830
Non-teaching	-5430	-5760
Risky DRGs		
All	-$5490	-$5320
Urban	-5430	-5290
Rural	-5960	-5570
Teaching	-6390	-5740
Non-teaching	-4610	-4890
Pool Size	4.9%	5.3%

a Mean dollar difference between payments and costs.

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to a 20 percent sample of the fiscal year 1986 MEDPAR data.

In summary, it is difficult to detect any significant change in overall outlier payments that would

Table B-45. Percent of All PPS Cases with Extraordinary Losses under Current Policy Using Two RCC Alternatives

Hospital Type	National RCC	Hospital-specific RCCs
All		
Losses > $11,300	1.0%	1.0%
Losses > $ 4,700	5.0	5.0
Urban		
Losses > $12,400	1.0	1.0
Losses > $ 5,200	5.0	5.0
Rural		
Losses > $ 7,300	1.0	1.0
Losses > $ 3,300	5.0	5.0
Teaching		
Losses > $14,100	1.0	1.0
Losses > $ 5,600	5.0	5.0
Non-teaching		
Losses > $ 9,500	1.0	1.0
Losses > $ 4,100	5.0	5.1
Pool Size	4.9%	5.3%

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to a 20 percent sample of the fiscal year 1986 MEDPAR data.

Table B-46. Percent of All PPS Cases with Extraordinary Losses under the Cost-only Option Using Two RCC Alternatives

Hospital Type	National RCC	Hospital-specific RCCs
All		
Losses > $11,300	1.1%	1.0%
Losses > $ 4,700	5.4	5.4
Urban		
Losses > $12,400	1.1	0.9
Losses > $ 5,200	5.5	5.5
Rural		
Losses > $ 7,300	1.1	1.0
Losses > $ 3,300	5.1	5.1
Teaching		
Losses > $14,100	1.1	1.0
Losses > $ 5,600	5.8	5.7
Non-teaching		
Losses > $ 9,500	1.0	0.9
Losses > $ 4,100	5.1	5.2
Pool Size	4.9%	5.3%

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to a 20 percent sample of the fiscal year 1986 MEDPAR data.

occur by changing from a national RCC to hospital-specific RCCs under current policy. However, under a policy that emphasizes cost outliers, there would be a disparity in outlier payments between low-RCC and high-RCC hospitals unless hospital-specific RCCs were used.

Precedence Options—ProPAC considered precedence options that would shift the payment emphasis from length of stay to cost by varying degrees. There are two basic approaches: (1) preserve day outliers but change the way in which dual outliers (46 percent of current outlier payments) are paid, emphasizing cost; and (2) eliminate day outliers entirely, paying cost outliers only.

ProPAC's simulation of alternative outlier policy options included three precedence options: (1) paying the greater of cost or day outlier payments for dual outliers (greater-of option), (2) changing the payment precedence for dual outliers from day to cost (cost-precedence option), and (3) paying on the basis of cost only (cost-only option). Table B-47 compares the mean payment differences for outlier cases under the three precedence options with current policy. Losses for outliers are displayed for all DRGs and for the subset of risky DRGs.

The pool sizes differ under each of these options. For all but the cost-only option, the pool size reflects differences in payments to dual outliers, not in the number of outlier cases. To obtain a comparable pool size under the cost-only option, the cost threshold was reduced so that more cases would qualify as outliers. Cost outliers were also identified using a single threshold for all DRGs. This increased the outlier payments for high-weighted DRGs, but is not likely to have affected the general conclusions. Because of time constraints, it was not possible to complete the analysis using identical pool sizes.

The changing pool size should be considered when comparing the effectiveness of the different options. For example, mean overall losses are identical under the greater-of option and the cost-only option, even though the greater-of option has a larger pool size. Losses are likely to be reduced

Table B-47. Mean Payment Difference[a] for Outlier Cases under Alternatives to Day Outlier Precedence, by Hospital Type

Hospital Type	Type of Outlier Policy[b]			
	Current Policy	Greater of Day or Cost	Cost Precedence	Cost-Only[c]
All DRGs				
All	-$7200	-$6570	-$7970	-$6310
Urban	-7290	-6650	-8160	-6320
Rural	-6550	-6060	-6790	-6200
Teaching	-7390	-6850	-8760	-6830
Non-teaching	-6990	-6280	-7160	-5760
Risky DRGs				
All	-8460	-7450	-9320	-5320
Urban	-8570	-7530	-9540	-5290
Rural	-7740	-6910	-7920	-5570
Teaching	-8610	-7720	-10230	-5740
Non-teaching	-8310	-7170	-8400	-4890
Pool Size	5.8%	6.5%	5.0%	5.3%

a Payment difference is payments minus costs.

b All options were calculated using hospital-specific RCCs.

c A single cost threshold was used to determine cost outlier status.

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to a 20 percent sample of the fiscal year 1986 MEDPAR data.

still further for the cost-only option if the pool size were increased to equal the pool size under the greater-of option. The cost-only option reduces losses for risky DRGs considerably more than any other option for each hospital group.

The cost-precedence option appears less effective than current policy in reducing losses. However, this occurs because the pool size for the cost-precedence option is 1.3 percent lower than current policy. When pool sizes are equal, losses under the cost-precedence are likely to be lower than under current policy. The losses are much lower when only cost outliers are recognized. This occurs even though the pool sizes for the cost-precedence and cost-only options are similar. The cost-only option is a more effective means for reducing losses than paying for both cost and day outliers, regardless of precedence. Similar conclusions are supported by Table B-48.

Conclusions

The Commission believes an outlier policy emphasizing costs is a more effective way to reduce extraordinary losses than the current policy of day precedence. The Commission also recommends the use of hospital-specific RCCs. The use of a national RCC under a policy of cost precedence would result in a significant shift of payments to hospitals with low RCCs. The Commission, however, does not recommend paying outliers exclusively on a cost basis because of insufficient evidence about the full effect of such a policy.

Further research is required on many other policy features before a fully integrated outlier policy can be developed. These recommended changes, however, would incrementally improve outlier payment policy. These include: the size of the outlier payment pool, methods for setting day and cost thresholds, definition of appropriate marginal cost factors, DRG-specific outlier pools, and the relationship between outlier payments and the indirect teaching and disproportionate share adjustments. Preliminary results from simulations of larger outlier pools indicate a significant reduction in extraordinary losses can be achieved by increasing the pool size. The amount of the reduction de-

Table B-48. Percentage of All PPS Cases with Extraordinary Losses under Alternatives to Day Outlier Precedence, by Hospital Type

Hospital Type	Type of Outlier Policy[a]			
	Current Policy	Greater of Day or Cost	Cost Precedence	Cost-Only
All DRGs				
All				
Losses > $11,300	1.0%	0.9%	1.2%	1.0%
Losses > $ 4,700	5.0	5.1	5.1	5.4
Urban				
Losses > $12,400	1.0	0.9	1.2	0.9
Losses > $ 5,200	5.0	5.1	5.2	5.5
Rural				
Losses > $ 7,300	1.0	1.0	1.1	1.0
Losses > $ 3,300	5.0	5.1	5.0	5.1
Teaching				
Losses > $14,100	1.0	0.9	1.3	1.0
Losses > $ 5,600	5.0	5.1	5.2	5.7
Non-teaching				
Losses > $ 9,500	1.0	0.9	1.1	0.9
Losses > $ 4,100	5.1	5.1	5.1	5.2
Risky DRGs				
All				
Losses > $11,300	2.6	2.4	3.0	2.0
Losses > $ 4,700	9.6	9.9	10.1	9.3
Urban				
Losses > $12,400	2.5	2.3	2.9	1.9
Losses > $ 5,200	9.5	9.7	10.1	9.1
Rural				
Losses > $ 7,300	2.7	2.5	2.9	2.2
Losses > $ 3,300	10.1	10.4	10.2	9.8
Teaching				
Losses > $14,100	2.5	2.2	2.9	2.0
Losses > $ 5,600	9.2	9.3	9.8	9.3
Non-teaching				
Losses > $ 9,500	2.7	2.5	3.0	1.8
Losses > $ 4,100	9.9	10.2	10.3	9.2
Pool Size	5.8%	6.5%	5.0%	5.3%

a Payments for all options were calculated using hospital-specific RCCs.

SOURCE: ProPAC estimates derived by applying fiscal year 1988 payment rules to a 20 percent sample of the fiscal year 1986 MEDPAR data.

clines, however, as the pool increases. ProPAC has contracted with the RAND Corporation to conduct a study of hospital daily incremental costs. This study will help address the question of appropriate marginal cost factors.

Recommendation

The Secretary should modify outlier payment policy to protect hospitals more adequately from the risk of extremely costly cases. Hospital-specific cost-to-charge ratios should replace a national cost-to-charge ratio for calculating cost outlier payments. Greater emphasis should be placed on costs rather than length of stay for determining outlier payments. As an interim step toward emphasizing costs, the Secretary should move from day outlier precedence to paying the greater of day and cost outlier payments. Furthermore, the Secretary should adjust threshold levels so that 40 to 50

percent of outlier payments are paid as cost outliers.

The Commission urges the Secretary to increase outlier contributions to the maximum of 6 percent of total projected payments allowed under the statute. A correction should be made in the following year's payments if the amount paid for outliers is different from the amount set aside. If necessary, the Secretary should seek statutory change for these initial improvements while continuing analysis to refine outlier payment policy. Further analysis should also include consideration of an increase above the 6 percent set-aside amount allowed under the statute.

Appendix C
Quality of Care

Appendix C
Quality of Care

INTRODUCTION

Appendix C contains background material on quality of care developed for the Commission during 1987-88. Additional Commission studies on the subject of access and quality of care will appear in the Commission's June 1988 report to Congress, *Medicare Prospective Payment and the American Health Care System.*

Materials in this appendix summarize studies undertaken to enable the Commission to better understand structure, process, and outcome measures of quality currently applied to Medicare hospital patients. These studies also review other quality and access issues related to care as it is shifted beyond the inpatient setting.

The Commission has a strong and overriding commitment to the quality of care furnished under the Medicare prospective payment system. The Commission carefully examines and monitors quality of care activities of the PROs and other Medicare quality review mechanisms. Several of the studies described in Appendix C were undertaken in part to better inform the Commission about PRO activities. Based on this continuing work and review, ProPAC repeats in 1988 its recommendation for a major evaluation of the quality of care activities of PROs.

A study of the preadmission review process is summarized in the first section of Appendix C. Preliminary findings from ProPAC's major research study of transitional and subacute hospital care follow. The next section describes trends in the development and use of hospital quality assurance software systems. In the final section, ProPAC consideration of the use and release of mortality statistics is described. The executive summary of a report on this subject developed under contract to ProPAC completes the material in Appendix C.

A STUDY OF THE PREADMISSION REVIEW PROCESS

As part of the Commission's quality of care agenda, Project HOPE undertook a study of the preadmission review process under ProPAC contract # T-33731391. The study focused on PRO and hospital preadmission review of elective hospital admissions.

For selected procedures, the PRO prospectively approves or denies Medicare payment for inpatient admission. The Commission anticipated that this PRO payment decision would influence physician and hospital admission decisions and practices. ProPAC was therefore concerned that quality of or access to care for beneficiaries might be adversely affected because patients who should have been admitted to the hospital were not.

To address ProPAC's concern, Project HOPE examined the scope, process, and results of PRO preadmission review. In less depth, this project also studied hospital preadmission review activities. Finally, perceptions about the purpose and impact of Medicare's and hospitals' preadmission review programs were collected from a variety of organizations. These included PROs, hospitals, medical societies, and hospital associations.

Project Tasks, Methods, and Data Sources

The project had four major tasks:

- A description of the PRO preadmission review program as mandated by law, HCFA regulations, and the PRO contracts with HCFA;

- A national mail survey of all PROs to identify each PRO's preadmission review procedures and decision criteria and to ascertain how they

apply the criteria in their decision-making process, their rates of review, and other information;

- A telephone survey of selected PROs to gain additional insight into their preadmission review process and criteria, particularly with respect to their consideration of social factors; and,

- A telephone survey of selected state hospital associations and medical societies and of individual hospitals to gain insight into their understanding of and role in the preadmission decision-making process.

Mail Survey Design and Response Rate—The mail survey was designed to describe various features and results of the PRO preadmission review program, including the procedures and conditions designated for preadmission review; the rationale for selecting these procedures; the number of preadmission cases reviewed and denied, by procedure; the main reasons for denials; the types of criteria used; the consideration of social factors; PROs' knowledge of hospitals' review activities; preadmission review conducted retrospectively; retrospective verification; SuperPRO evaluation; and use of out patient surgery lists.

The survey was sent to all 54 PROs. Two PROs from the U.S. territories were omitted from the survey population as they are not required by HCFA to do preadmission review. Forty surveys were completed. Thus, the response rate was 77 percent (40/52 surveys).

Telephone Interview Samples: States, Organizations, and Hospitals—Telephone interviews were conducted with a group of private organizations and hospitals in ten states. Specific methods were used to identify the organizations and hospitals that were interviewed. The sample selection methods are described below.

States—In consultation with ProPAC (and with input from HCFA and the American Association of Retired Persons), a sample of ten states was chosen for these interviews. Selection was based on the following criteria: the PROs' completion of the mail survey; their responses to questions concerning social factors and knowledge of area hospitals' review activities; the number of preadmission reviews and denials; the scope of the preadmission program; and the state's geographic location and urban/rural composition.

The states chosen were: Alabama, California, Colorado, Connecticut, New York, North Carolina, North Dakota, Oregon, Texas, and Wisconsin. This was not a random sample and, thus, may not be representative of all PROs nationwide. It was, however, purposefully chosen so as to represent a diverse group of PROs and states.

Organizations—Within these states, representatives from a total of 28 organizations were interviewed: 10 state medical associations, 10 state hospital associations, three medical specialty societies, three organizations of quality assurance professionals, one organization of social workers, and one PRO medical director.

Hospitals—Representatives from a total of 34 hospitals were interviewed. This included three hospitals in six of the sample states and four hospitals in each of the other four sample states.

The objective of the hospital selection process was to obtain a sample representing both small and large, urban and rural, and teaching and nonteaching hospitals. Information from the interviews with the PROs and professional societies helped to identify hospitals involved in preadmission review. This was supplemented by the AHA's *Annual Guide to Hospitals*.

Design of Telephone Interviews—The focus of the interviews for the various groups differed for state organizations and hospitals. In interviewing state organizations, the survey had four general topic areas. First, Project HOPE asked about the organization's independent activities related to preadmission review. Second, organizations were questioned to determine the extent of their knowledge about PRO and hospital preadmission review activities. Resondents were also asked about their perception of the potential impact on access to and quality of care. Finally, they were asked about their reaction to preadmission review by Medicare beneficiaries and health care professionals.

In the interviews with individual hospitals, the survey encompassed two main areas of interest.

First, the hospitals were asked about their understanding and perception of the PRO preadmission review process. In addition, they described their hospitals' own preadmission review activities.

Major Findings

PRO Preadmission Review—General findings from the study of PRO activity in preadmission review are discussed below.

Scope—The present scope of PRO preadmission review is limited to five procedures. These include pacemaker implants and four other procedures selected by each individual PRO. This is a substantial decrease in scope from the first PRO contract.

The eleven most commonly designated procedures are breast biopsy, carpal tunnel release, cataract extraction/lens procedure, cholecystectomy, coronary artery bypass graft, dilation and curettage, endoscopic procedures, hernia repairs, hysterectomy, total hip/knee replacement, and transurethral resection of the prostate.

Criteria—The criteria used by the PRO in this review process address medical necessity and appropriateness of site. The criteria contain subjective language. Explicit criteria vary considerably across PROs. However, common types of criteria can be found in many PROs.

One set of criteria that a number of PROs use, at times with modifications, is ISD-A criteria (defined below). The ISD-A review system was developed by a private firm, InterQual, to screen hospital admissions and subsequent hospital services for medical necessity and appropriateness of the level of care.

The four ISD-A system components are: intensity of service (I), severity of illness (S), discharge screening lists (D), and appropriateness criteria (A). The first component lists diagnostic and therapeutic services that generally can be provided only in a hospital. The second consists of objective, clinical parameters assumed to reflect the severity of illness. The third provides specific indicators of the patient's stability for discharge. The fourth component reviews the use of special care units and certain clinical support services.

Process—The decision sequence to apply the criteria is identical across PROs. A nurse reviewer conducts initial review of all cases, and can approve payment if the criteria are satisfied. Only a physician reviewer can deny payment. Reconsideration and appeal processes provide opportunities to reverse payment denials. PROs do not follow-up cases for which they deny inpatient payment.

Results—The payment denial rate, which averages 2 percent of cases reviewed, is very low and has decreased over time. This decline is probably due to a reduction in the scope of PRO review, and a decline in the number of borderline cases that are presented for PRO review. Further, many reconsiderations and appeals result in subsequent payment approval.

Social Factors—PROs may consider criteria related to social factors, such as need for transportation or home conditions, in preadmission review. Although not all PROs have explicit criteria on social factors, they seem to have a common approach to considering these factors. Most PROs will consider social factors in their review decisions, but *only* if these factors have a potentially negative impact on the patient's medical condition. This must be recorded by the attending physician in the patient's record.

Distance from the hospital is the most problematic social factor, particularly in rural areas. Another problematic social factor is a patient living alone, because the direct impact on the medical condition is hard to demonstrate.

Hospital Preadmission Review—The survey obtained considerable information about hospitals' own preadmission review practices and policies. Most hospitals have formal preadmission review programs. Over half of surveyed hospitals review more than the PRO requires, usually 100 percent of elective Medicare admissions. Hospitals also have preadmission review requirements for privately insured and managed-care plan patients.

The study indicated that the ability to staff an effective preadmission program is related to hospital size. Smaller, rural hospitals are less likely to go beyond the PRO requirements.

Hospital interviews indicated that the purpose of hospital preadmission review is to prevent retrospective payment denial. Another purpose is to improve quality of care by assuring the necessity and appropriate level of care. Most hospitals reported that they have an educational program for their admitting physicians.

In their preadmission review programs, most hospitals reported using their PRO's criteria, some version of the ISD-A criteria, or a combination of both. Most hospitals also reported considering social factors, including distance, ability to provide self-care post-operatively, and weather conditions.

When a hospital issues a formal payment denial, the PRO and the beneficiary receive written notice. The PRO then upholds or reverses the hospital's denial decision. Informal hospital review also occurs, probably more often than formal review. The PRO involvement does not take place with informal review.

Use of 23-Hour Observation Units—The study found that growing use of 23-hour observation units reduces the need to admit borderline cases. This is reported to alleviate the problems of inadequate patient preparation or follow-up in cases of day surgery.

Hospitals are reimbursed under Medicare Part B for 23-hour observation services. Patients must pay an outpatient deductible and copayment, but avoid having to pay the inpatient deductible.

Perceptions About Preadmission Review Programs—Representatives of a number of organizations and groups were interviewed to gain further insight into the strengths and weaknesses of the preadmission review process. The perceptions of the groups that were interviewed are discussed below.

Overall Perceptions—Most surveyed organizations are not concerned about preadmission review. They are much more concerned about other areas of PPS (e.g., premature discharge, sanctioning of physicians, payments to rural hospitals). A cooperative relationship between the PRO and physicians leads to the most favorable perception of preadmission review.

It was reported that beneficiaries are often puzzled about the purpose and requirements of preadmission review. At times, hospitals request preadmission review of cases that do not require such certification. It appears that hospitals confuse private insurer requirements with PRO requirements, or hope to guarantee payment by receiving the PRO opinion in advance.

Some physician and hospital representatives expressed disappointment at the decreased scope of PRO preadmission review. Payment approval or denial has become more uncertain, thus increasing hospital and physician responsibility for admission decisions.

They also reported concerns about legal responsibility when a patient suffers adverse outcomes as a result of non-admittance resulting from a payment denial.

Purpose—Most organizations that were interviewed believe the purpose of preadmission review is to reduce unnecessary admissions. Other purposes cited include: to improve quality of care, to conserve Medicare dollars, to increase the bureaucracy, and to limit payment for medically necessary care.

Impact—Those interviewed reported that the general impact of preadmission review has been to reduce elective admissions and retrospective PRO denials. Some organizations feel that the impact of Medicare preadmission review has been minor compared to that of private insurers and managed care plans. Hospitals note that case complexity increases as elective admissions decrease.

Interviews indicated that for physicians, preadmission review has led to a change in admitting practices and an increasingly complex admitting process.

Most respondents indicated that access to and quality of care have not declined as a result of preadmission review. However, some concerns were expressed about the inadequacy of services for patients who are denied payment for inpatient admission. In particular, access remains a great problem in rural areas where alternative sites of care are not available. Social factors may also be more

significant in rural areas, and recent closings of small, rural hospitals compound the problem.

The study found that hospitals have responded creatively to the needs of borderline cases. Examples include residence halls or hotels near hospitals and increasing use of 23-hour observation units.

Conclusions

In general, the study indicates that PRO preadmission review does not result in quality of care or access problems. This is largely because the limited scope and the decision sequence of the review process results in minimal payment denials.

The 23-hour observation units seem to be an important quality-of-care mechanism for patient safety, as well as hospital financial protection.

Hospitals' informal review activities have supplanted some formal PRO review.

The variation in explicit preadmission review criteria across PROs may lead to inconsistent decisions. The limitations on the use of social criteria is another concern, particularly for patients in rural areas.

Some confusion remains about the PRO preadmission review goals and process. Although physicians are becoming more familiar with the program, further education for physicians, hospitals, and beneficiaries is desirable. To improve beneficiaries' protection and satisfaction, there should be more education about PRO and other types of preadmission review.

SUBACUTE AND TRANSITIONAL CARE

The Commission's major extramural study of subacute and transitional care in hospitals will be completed in the spring. This summary provides a brief background of the study and a discussion of some preliminary findings. In subsequent Commission Technical Reports and in ProPAC's June 1988 report to the Congress, *Medicare Prospective Payment And The American Health Care System*, additional information will be presented.

Background

In previous reports, ProPAC noted its concern about the impact of PPS on beneficiaries' needs for post-acute care services. This led to a major research project on subacute and transitional care. Contracts were awarded to Lewin and Associates (Lewin) and the American Hospital Association (AHA) for the study, which is designed to:

- Describe what is meant by subacute and transitional care,
- Measure and describe the prevalence and distribution of subacute and transitional care,
- Determine cost and payment sources for this care, and,
- Describe the implications of these findings on quality of care.

The study addresses these issues primarily through a national survey of hospitals, conducted by AHA and analyzed by Lewin, and case studies by Lewin in five states.

Preliminary Findings

Preliminary findings described below are based on initial review and analysis of national survey data, and completion of the five case studies. Extensive analysis and review is continuing. ProPAC anticipates that this additional work will result in the development of a much more definitive list of issues and findings.

Definition of Subacute or Transitional Care— Subacute care offered by hospitals may be defined —and most often is defined— as care provided to patients who do not meet established criteria for "medically necessary acute care." There is a wide range of service intensity associated with subacute care. At one end of the spectrum is immediate post-acute care that is intensive in terms of the needs of the patient and the skill and time of the provider. This care is sometimes called "super-skilled" nursing or subacute care. At the other end of the subacute care spectrum is care which is custodial in nature, involving minimal needs of the patient and minimum provider time and skill.

Incidence—The frequency of subacute care in acute care beds is small. The national survey indicates that about five percent of discharged Medicare patients spend at least one day as an identified subacute patient, resulting in just over 4

million days of Medicare subacute care in acute care beds per year. About half of the patients classified as subacute spend one week or less in this status.

Types of Subacute Care—Subacute patients in acute care beds can be generally classified into several categories that are not necessarily mutually exclusive:

- Patients assigned to observation beds, usually associated with temporary care situations such as outpatient post-surgical care,
- Patients receiving hotel-type services,
- Patients who pay for their own care at a subacute level,
- Patients in swing beds,
- Patients awaiting placement in a nursing home, and,
- Patients in hospital-attached or hospital-based nursing homes.

Fifty-five percent of subacute patients are awaiting nursing home placement. These patients also account for the vast majority—80 percent—of the subacute days of care. The extent of subacute care that results from patients awaiting placement varies from place to place. Some states seem to experience enormous numbers of subacute days in part because of the nursing home placement back-up, while others with similar proportions of nursing home beds report many fewer days of subacute care in acute care beds.

Similar patients can be found in nursing homes and at home—with or without home care.

Cost and Payment for Subacute Care—It appears that substantial portions of currently-defined subacute days were previously included in the inpatient stay. This is particularly evident in cases where the patient is moved after a very short acute-hospital stay into an attached nursing home, PPS-exempt unit, or home care in order to recover or receive rehabilitation services. In some of these situations Medicare may be paying "twice." In other situations, the beneficiary may have to pay for post-acute nursing home or home care during a recovery period that was previously considered part of the Medicare-covered acute care stay. This is troublesome in light of the fact that Medicare-reimbursed days of skilled nursing facility (SNF) care and home health visits per enrollee have declined since 1984.

The cost and payment impacts related to subacute care are extremely dependent upon state, local, and regional policies and conditions. Factors related to the variations include: state regulatory control over nursing home bed additions or hospital bed conversions; fiscal intermediary practices; and use and application of medical necessity criteria by PROs, fiscal intermediaries, or hospitals themselves.

Quality of Care—The impact of subacute care on quality of patient care is likewise dependent to a great extent on particular circumstances, practices, and alternatives available to local hospitals. Generally, a number of the practices encountered and reported appear to enhance quality of care. For example, while the national average length of stay for Medicare orthopedic joint replacement patients is about 15 days, case study hospitals with attached nursing home beds have reduced the acute portion of the stay to three to six days. Patients are then moved to the attached nursing home, but preliminary observations indicate that intense and skillful treatment patterns exist in many of these situations.

Primary Issues for Further Review

Several issues seem critical at this point, although there is need for additional review and refinement of the data. Most important among these issues is variation in beneficiary access to post-acute care. That is, there may be increasingly differential access to Medicare-covered post-acute care.

The meaning of "medically-necessary acute care" is being redefined nationally as a result of PPS payment and incentives. At the same time, implementation of Medicare coverage policy often occurs at the local level. These decisions interact with other local conditions to change the nature of Medicare coverage for a spell of illness. Consideration needs to be given to whether the value of Medicare coverage of an acute spell of illness is

becoming more localized and less national. The Medicare program is designed as a national program with national benefits. Changes in this program orientation deserve the careful attention of policy-makers.

QUALITY ASSURANCE SOFTWARE: TRENDS IN THE HOSPITAL INDUSTRY

In June 1987, ProPAC sponsored a small study of automated quality assurance (QA) systems for hospitals ("Assessing Quality Assurance Software Packages," by Health Economics Research, Inc. (HER) under ProPAC task order contract # T-33731249). The purpose of this study was to obtain information on hospital activities devoted to monitoring quality of inpatient care. ProPAC intends to combine results from this study with information from other projects to identify strengths and weaknesses of the existing quality assurance system.

Recent studies indicate that QA is moving to methods requiring systematic monitoring, statistical analysis, and normative comparisons. The 1987 Joint Commission on Accreditation of Healthcare Organizations (JCAHCO) Quality Assurance Standards state that there should be an "ongoing quality assurance program designed to objectively and systematically monitor and evaluate the quality and appropriateness of patient care . . ." Automated QA systems enable hospitals to implement generic screens, report by exception, review explicit practice patterns, and compare hospital trends to national norms.

Defining Quality Assurance Systems — Functions And Features

HER examined systems with certain common characteristics. In general, HER reviewed QA software that enables hospitals to develop and apply screens (user- or vendor-defined) for ongoing monitoring of patient care. Examples of generic screens include:

- Admission for adverse effect of outpatient and emergency management;
- Unplanned return to intensive care unit or special care unit;
- Acute myocardial infarction during or within 48 hours of surgical or invasive procedure; and
- Cardiac or respiratory arrest.

Patient records that fail any screen are identified and the related problems may be looked at more closely through trend analysis or document review. The use of screens, flexible reporting, and other system characteristics provides hospitals with information support for various hospital QA functions, which are described below.

Surgical Case Review—Provides information on cases with instances of returns to the operating room, discrepancies between pre-op and post-op diagnoses, complications, surgical deaths, etc.

Pharmacy and Therapeutics Review—Examines adverse drug reactions and protocols; assists in maintaining drug list or formulary.

Drug Usage Review—Provides information on frequently prescribed drugs, interaction of drugs, and drugs identified by Infection Control as requiring assessment.

Blood Usage Review—Provides information to determine appropriateness of all transfusions confirmed, transfusion reactions, and ordering practices.

Medical Record Review—Monitors timeliness of record completion. Findings from this review are to be used in the medical staff reappointment process.

Privileging and Credentialing—Allows for data collected through medical staff monitors and generic screens to feed into physician practice profiles. In-service education, continuing medical education, membership information, utilization patterns, committee participation, and medical records completion can be organized and displayed to assist in the reappointment and evaluation process.

Incident Reporting, Infection Control, and Utilization Review— Provides information on patient incidents such as falls and medication errors. Collects data on antibiotic usage and performance and records PRO denials.

Project Methodology

The project examined the features of QA software packages on the market today and the impact of these packages on hospital QA functions. Information was obtained through two separate surveys. A survey was conducted of 20 software vendors about product characteristics, company experience, pricing, and operational issues. HER also surveyed a random sample of 62 hospitals to determine the adoption rate for QA software. For those hospitals that had purchased QA software, HER then obtained information about package selection and implementation, and the effect of the system on quality monitoring activities.

Because the random survey produced only eight hospitals that had purchased a QA package, HER relied on various software vendors for additional hospital referrals. This resulted in a sample that was dominated by vendor-referred hospitals. An additional nine hospitals were vendor referred.

Findings From the Software Vendor Survey

QA software is a new, expanding field. The majority of vendors have been marketing their products for two or three years; two of the packages have been on the market for less than a year. The number of installations vary significantly. Four of the vendors reported more than 100 installations, while six of the vendors reported ten or fewer installations.

System features and functions vary widely among the software packages. The products on the market range from modules with a single focus, such as credentialing or infection control, to comprehensive packages that combine several QA functions into a single system.

The more costly packages do not always have the most comprehensive set of functions. There is a wide variation in package prices at all levels of functionality (i.e., depth of sophistication for each system component). Overall, the totally integrated systems (those that are linked to other hospital information systems for medical records, admitting, billing, etc.) are the most expensive.

Some of the available packages serve as an interim measure that hospitals will replace with a more sophisticated system at some point. Many vendors are preparing new products or revisions to existing packages. New directions for QA software will probably emphasize concurrent, ongoing reviews that are only possible with a comprehensive software package.

Findings From the Hospital Survey

Relatively few hospitals have already installed QA software. Of the random sample of hospitals, only 12.9 percent had already purchased and installed a QA software package. An additional 6.5 percent developed a QA package in-house. Findings suggest that hospital interest in acquiring a QA package is increasing rapidly, however.

The QA system implementation phase varies significantly among hospitals. Respondents reported transitions lasting from one week to over nine months. Often the entire approach to QA is changed with the introduction of the automated package. Medical staff responsiveness and in-service training requirements may also affect implementation time.

Universally, respondents reported that the software has had a major impact on the operation of their QA departments. Hospitals reported that their monitoring activities and review are far more extensive with the software. They are now able to produce more detailed reports that analyze the total patient population. The reports include more parameters, criteria, and screens.

Most of the hospitals reported that the installation of the QA software stimulated the hospital to adopt a far more comprehensive and centralized approach to QA which, in some cases, required increased staff. Half of the hospitals reported no change in staffing; several others reported an increase of between .5 and 1.0 FTEs, primarily for data entry and reporting.

Respondents were extremely positive about the ability of the software to identify quality problems that might otherwise have gone undiscovered. More than one third of the hospitals reported that the system had already uncovered a problem. For example, one respondent credited the software with finding medication errors that would otherwise have gone unnoticed.

As noted by HER, the QA software market is undergoing an extraordinary period of change. Vendors are continuously introducing new products and revising existing packages. ProPAC intends to continue to monitor hospital QA software systems.

THE USE AND REFINEMENT OF HOSPITAL MORTALITY STATISTICS

The Commission's interest in moving toward outcome-oriented measures of quality of care led to a review of hospital mortality statistics. Central to this review were the 1986 and 1987 HCFA releases of hospital-specific Medicare mortality statistics. After discussion, ProPAC indicated its general support for this initiative in a November 13, 1987 letter to the HCFA Administrator.

In this section of the Appendix, ProPAC presents background information on hospital mortality statistics. In the first section HCFA's process is reviewed. This is followed by the executive summary of a study done for the Commission by Project HOPE. This study reviews the literature on hospital mortality studies and the various methodologies used in hospital outcome studies, with particular focus on the methodology used by HCFA. Project HOPE concludes that HCFA's adjustment methodology is the best available method, given limitations in the data. The study also identifies future research needs.

HCFA Release of Hospital-Specific Mortality Data

In an attempt to make better information on health outcomes available, HCFA released hospital-specific mortality data in December 1987. This release followed a year-long process of consultation and discussion with interested groups. The topic received a great deal of attention from hospitals, beneficiary groups, and others. HCFA asked that the Commission review and comment, if appropriate, on both the process and the details of the release. This section is a description of HCFA efforts.

History and Background—In March of 1986 HCFA prepared facility-specific mortality information based on 1984 billing data for the Peer Review Organizations. Their intent was for the PROs to use these data to target hospitals with special reviews aimed at potential problems. Subsequent Freedom of Information Act requests resulted in the release of these data to the media, causing furor throughout the hospital and health care community. Even those who applauded the availability of the data admitted to the limitations involved in this first release. Thus, in the fall of 1986 HCFA developed a planning and consultative process for the release of future mortality data.

In August 1987, HCFA's work resulted in the publication of a notice in the *Federal Register* describing in detail plans for release of 1986 hospital-specific mortality data. In September, the data were released privately to each hospital, allowing facilities to validate and provide comments on their specific data. The final, formal release occurred December 16, 1987. Along with the data, HCFA published information from any hospital that wished to submit comments on its data.

Content of Release—Data from 1986 Medicare bills were used to present, for each short-term acute care hospital, the following information:

- Number of Medicare beneficiaries treated,
- Percentage of beneficiaries who died within 30 days of admission, in total, and for 16 diagnostic categories, and
- Expected percentage of beneficiary deaths, calculated on the basis of overall national experience with patients of similar age, sex, incidence of complicating diseases, and prior hospitalization in 1986.

Expected percentages were presented as a range of rates which included the values expected for 95 percent of all cases. Expected percentages were shown for total beneficiary deaths and for each of the 16 diagnostic categories.

The information was listed alphabetically, by state, and by hospital name. As noted, any hospital that wished to provide comments about its data had those comments published with the December release, although HCFA edited particularly long comments.

Planning and Consultative Process—Beginning in December 1986, HCFA had a series of technical

and policy consultations to assist them in preparing the mortality statistics release. Formal policy meetings with groups of experts representing consumer, provider, and academic organizations were held on several occasions. Experts in health services research, statistics, and clinical medicine were consulted. A formal research symposium was held. The August *Federal Register* notice invited public response to the general and specific details of the planned release. Finally, hospitals provided comments on their own mortality data for release with the final data.

Major Issues—There are several major policy issues related to this release of information that arouse strong feelings and differences of opinion among those most affected. These are mentioned below, along with a general description of some of the viewpoints.

Appropriateness of Data Release—Some still believe that this information cannot be understood by the general public. They believe release of mortality statistics results in much more harm and fear than enlightenment. Some fear the misuse of data for advertising and marketing purposes. Still others believe the lack of sophisticated adjustment methodologies produces data that should not be used for facility comparisons.

Others argue that it is time for consumer information of this type to be available, to better inform both patients and the medical and health care community. However, they believe that the steps HCFA has taken to refine the data are appropriate, even though continued analysis and research are necessary.

Inclusion of Out-Of-Hospital Deaths—The hospital industry and others have noted that use of a 30-day post-admission death rate measures deaths that may be completely independent of hospitalization or medical condition. On the other hand, using a measure that includes post-discharge deaths allows for review of an episode of illness, all of which may not be treated in an inpatient setting. In fact, PPS incentives seem to have moved much care out of the hospital, and this post-discharge measure is an appropriate representation of the results of hospital intervention.

HCFA stated that it would be misleading to use only in-hospital rates because in-hospital deaths are closely correlated with length of stay. Lengths of stay vary considerably for reasons such as administrative practice, rather than for reasons related to the condition of the patient. HCFA also noted that the 30-day interval was selected because it is the accepted post-operative period, and that period was extended to nonsurgical cases.

Rates by Groupings of Diagnostic Codes—The release included information for each hospital about mortality in certain diagnostic groups. Ten "high risk" diagnostic groups—severe acute heart disease, severe chronic heart disease, pulmonary disease, renal disease, severe trauma, sepsis, metabolic and electrolyte disorders, stroke, cancer, and gastrointestinal catastrophes—were reported. Six "low risk" diagnostic groups—gynecologic disease, urologic disease, orthopedic conditions, low-risk heart disease, gastrointestinal disease, and ophthalmologic disease—were also reported. These 16 categories account for 70 percent of Medicare hospitalizations and 80 percent of deaths associated with hospitalization.

Some believe that release of mortality statistics in these diagnostic categories is unnecessary and further confuses an already difficult subject. Others argue that the specific definitions and groupings developed by HCFA are too general and mask more specific, and more usable, information. Consumer groups, for example, have complained that using general groupings of procedures instead of individual DRGs or treatments (as was done in the March 1986 data) obscures hospital comparisons.

Adjustments to the Data—One criticism of the March 1986 data release concerned the lack of adjustments to account for patient differences. Therefore, the 1987 release was based on a statistical methodology that adjusts each hospital's data to take into account patient age, sex, incidence of complications, prior hospitalization during the year, and status as a transfer patient. Most observers support the use of these adjustments, but many believe that the absence of a severity adjustment renders the data useless, or at least of questionable accuracy. However, the development of a definitive severity measure is several years away, and research on this subject is unlikely to be productive in the near future. Those who support early release of mortality data believe that it is inappropriate to await the development of a definitive severity measure.

Other adjustments are the subject of disagreement. For example, the use of race as an adjustment is open to debate. HCFA used race in the 1986 release, but chose not to use it in 1987. The interpretation of the results from the statistical model is another subject of disagreement among some technical observers.

Additional Work Underway on Mortality Statistics

ProPAC is one of a number of organizations that have supported research and analyses on this subject. The Commission contracted with Project HOPE to produce a review of mortality studies and other outcome measures. The executive summary of this report appears below.

The Office of Technology Assessment (OTA) is conducting a major study entitled, "The Quality of Medical Care: Information for Consumers." Assisted by a panel of 21 experts, OTA is reviewing information related to the availability of current information for consumers, their use of such information for decision-making purposes, and the dissemination of quality indicators. A series of selected indicators of quality, including hospital mortality rates, is being analyzed in detail. The study will be completed in the spring of 1988.

Several state organizations have been active in the area of mortality data. The Maryland Hospital Association for several years has made mortality data available to its members, along with supplementary information to facilitate comparisons. The California PRO has provided mortality rates for that state's facilities in 1986 and 1987. As with the HCFA release, California makes data available to hospitals for their comment first, then releases the data to the public.

HCFA will continue research and consultation aimed at improving the process of mortality statistics development, adjustment, and release. The raw data they have used will be made available to organizations that wish to conduct their own analyses. They plan continued work with major health care, health research, and consumer organizations. Appropriate changes resulting from their continued analysis and consultation will be included in the development of future releases.

[The material that follows is the executive summary of a study completed for ProPAC by Project HOPE under task order Contract T-47540329, January 1988.]

A Review of Adjustment Methodologies for Hospital Outcome Studies Executive Summary of a Study by Project HOPE

Introduction—There is a broad consensus in the health policy field that quality of care is an important part of any examination of the health care system. Yet, quality of care is difficult to measure. One measurement approach to assessing hospital quality of care uses outcome measures such as the rate of mortality, the rate of readmission, or the rate of nosocomial infection. By comparing the properly adjusted outcomes of patients in different hospitals, an analysis of outcome measures can make inferences about the relative quality of care provided in each facility.

The Health Care Financing Administration has twice released hospital-specific mortality rates—once in March 1986 and again, after considerable review and modification of statistical methods, in December 1987. In addition, there is a large and growing literature of studies on hospital-specific outcome measures. Many of these studies use quite different methods for data collection, statistical adjustment, and analysis.

Because an outcome-based approach is likely to continue as the most important method for assessing provider quality of care, it is important to systematically review this literature.

Purpose and Methods—The principal goal of this study was to review the literature on hospital mortality studies, to compare the alternative methods of adjustment for differences in patient characteristics, and to review the use of other outcome measures. The articles reviewed were collected from a variety of sources representing the medical and social science literature. The literature search identified 31 articles examining hospital mortality as an outcome and adjusting for individual characteristics of patients, and 12 articles examining other outcome measures. Each of the articles selected for review was abstracted and summarized. These abstracts identify the definition of the outcome included in the study, the source of data, the

population represented in the study, the types of adjustments made, and the methods of adjustment. A methodological critique of each article is also included.

The results of these studies are used to assess the adequacy of HCFA's methodology for its release of 1986 mortality data (i.e., the December 1987 release). The public information release includes the following: hospital; the number of Medicare beneficiaries treated by the hospital; the actual percent of Medicare beneficiaries who died within 30 days of admission; and the percentage range of Medicare beneficiaries expected to have died on the basis of age, sex, the incidence of complicating conditions, status as a transfer patient, and number of prior hospitalizations during the year. The range includes 95 percent of the probable values of expected mortality. In addition, HCFA's mortality report provides the number of beneficiaries treated, the actual death rate and a range of expected death rates for beneficiaries in each of 16 medical conditions. These are divided into 10 high-risk conditions: severe acute heart disease, severe chronic heart disease, pulmonary disease, renal disease, severe trauma, sepsis, metabolic and electrolyte disturbances, stroke, cancer, and gastrointestinal catastrophes. In addition, there are six low-risk medical conditions as follows: gynecologic disease, urologic disease, orthopedic conditions, low-risk heart disease, gastrointestinal disease, and ophthalmologic disease.

HCFA's methodology compares the actual mortality rate for Medicare beneficiaries within 30 days of their last hospital admission in the calendar year to the predicted rate if the mortality pattern paralleled national trends for patients with the same characteristics. This predicted rate is computed by assessing the risk of death associated with age, sex, primary diagnosis, additional diagnoses, number of prior hospitalizations during the year, and status as a transfer patient. The probability of a given individual patient dying, given a particular combination of these characteristics, is estimated using a logistic regression model. These probabilities are summed across individuals in a given hospital to obtain the hospital's expected mortality rate.

Mortality Adjustment—The primary conclusion of this study is that the adjustment methodology that HCFA has employed for its release of 1986 hospital mortality data for Medicare discharges is the best available method, given limitations in the data. This conclusion is based on an extensive review of the literature and analysis of mortality studies. Furthermore, a review of the literature and analysis of studies of other outcome measures found little research using alternative measures to identify differences in hospital quality. Conclusions regarding the specific aspects of HCFA's methodology are summarized below.

It is generally agreed that the definition of mortality employed by HCFA is appropriate. Mortality for a specific period after admission is most suitable for hospital comparisons because it is not confounded by differences in length of stay and focuses upon mortality as a result of hospital care. Other definitions of mortality are less suitable. Population-based mortality compares mortality rates among populations regardless of hospitalization and does not solely measure mortality as a result of hospital care. In-hospital mortality is confounded by length of stay which varies due to factors such as different hospital practice patterns.

Most of the studies reviewed used in-hospital mortality because of the difficulty of data collection after discharge. Those studies that did examine mortality for a period of time after discharge followed patients for greater than 30 days. HCFA's selection of 30 days can be justified because: (1) it is accepted as the post-operative period, and (2) several studies found high correlations between mortality rates at various times after admission.

Most of the criticism of HCFA's release of mortality data centers on the adequacy of the severity adjustment. Because severity measures for which data collection is cost-effective are still being developed, HCFA's current severity adjustments may be inadequate. However, because the data release was only intended to serve as a preliminary indicator of problems in quality, the possible lack of an adequate severity adjustment should not prevent the data release from serving its purpose. Further analysis of hospitals with higher than expected mortality is necessary in order to make statements about the quality of care. The review of the literature underscores this cautious approach. Many studies reviewed in this work concluded that it was unclear to what extent variations in hospital

mortality result from differences in patient severity or quality of care.

HCFA has adjusted for comorbidities, the number of prior hospitalizations during the year, and status as a transfer patient. These measure the presence of underlying conditions, both chronic and acute, and, to some extent, the stage of illness. The most common severity adjustments used in studies examining a variety of conditions were for the presence of comorbidities and the source of admission. Studies that were limited to specific conditions often adjusted for physiologic status and disease stage. However, these types of adjustments are difficult to make because of the cost of data collection for severity measures. The improvement in the adjustment may not be substantial enough to justify the added cost. For example, the Stanford study (1976) found that providing more detailed severity adjustments did not significantly alter the results.

HCFA's categorization of admissions into 16 medical conditions based on diagnosis has been criticized as not being specific enough. Many of the studies reviewed limited their analysis to specific diagnoses or procedures. Those few studies that examined patients with a wide variety of conditions either adjusted for diagnosis or grouped patients according to risk of death. Since no study compared different ways of categorizing patients on the basis of medical condition, no conclusions can be made regarding the adequacy of HCFA's classification. The need for specificity must be balanced with other considerations. For example, the more classifications there are, the more difficult it is to find statistically significant results.

Other adjustments for demographic and other variables should be made if they satisfy the following conditions:

(1) They exhibit a causal effect on mortality.

(2) Their distribution is expected to vary by hospital.

(3) They have little or no effect on quality.

(4) They are not under the control of the hospital.

For the 1987 release, HCFA adjusted for age and sex. The literature review found no additional variables that were statistically significant predictors of mortality and consistently satisfied conditions (1) and (2) above in a number of studies. Race, which had previously been adjusted, was eliminated from this year's release primarily because it failed condition (3) above.

After a review of the alternate methods of adjustment, it is the conclusion of this report that logistic regression is an adequate analytical model. Compared to linear regression, it reduces the bias that results when the independent variable is dichotomous and the probability of the event is small. There is virtually no difference between logistic regression and indirect standardization. These three were the primary adjustment methodologies identified in the literature.

Patient-level analysis can be justified over hospital-level analysis because the factors that account for mortality are best explained at the patient level. Analysis at the hospital level may result in aggregation bias. Most of the studies reviewed conducted their analysis at the patient-level.

While HCFA's current methodology is the best available given the data limitations, additional research in several areas may improve the methodology for the future. These include analysis in the following areas:

(1) Tracking the consistency in mortality rates and other outcome measures from year to year to assess reliability.

(2) Comparing correlations between mortality rates and other outcome measures to assess the validity of mortality as a measure of quality.

(3) Using other outcome measures to identify differences in hospital quality.

(4) Alleviating the problem of small sample sizes by aggregating observations over several years, examining only conditions with high mortality rates, or employing other techniques.

(5) Analyzing alternative ways to improve the accuracy and uniformity of data.

(6) Comparing various techniques of grouping patients by medical condition.

Other Hospital Outcomes—There are a number of outcome measures related to quality of care that may serve as alternatives or adjuncts to mortality rates. Prominent in discussions of alternative outcome measures are: (1) readmission rates, (i.e., the rate at which patients must return to the hospital to obtain additional therapy for the same episode of illness), and (2) nosocomial infection rates (i.e., the rate at which patients acquire life-threatening or debilitating infections during a hospital stay). Other measures include rates of complications, rates of disability, and physiologic status measures. Rates of complications are variously defined by authors to suit the purposes of particular studies. However, they are more inclusive than infection rates and more general than the subset of complications leading to readmission.

Any of the alternative outcome measures may be preferable to mortality rates as a measure of quality of care. Mortality is a relatively rare event and mortality rates measure only the extreme instances of the severity of outcome. Poor quality of care may be reflected in health status less serious than mortality. Thus, morbidity or disability may capture more of the variation in health care quality than does mortality. Conversely, mortality has a number of advantages over the alternatives. Mortality is readily obtainable for most populations in the U.S. This is certainly not the case for other outcome measures. Mortality also has the advantage of being uniformly defined and readily validated. The preferable approach may be to use a variety of measures of mortality, morbidity and disability to provide valid measurement of quality of care.

The principal conclusion regarding the literature on alternative hospital outcome measures is that a great deal of further research is needed before they may be validly used as indicators of hospital-specific quality of care. None of the studies reviewed focused on these outcomes as a measure of quality of care, although many provide direction in measuring and statistically adjusting outcomes. However, before an adequate direct comparison can be made between mortality and any of these other outcome measures, more work is needed to insure that the alternative outcome is measured with comparable validity and the appropriate patient-level adjustment factors have been identified. As in the case of mortality, the literature on alternative outcomes has already identified the difficulty of measuring severity of illness at admission.

Hospital Readmissions—Using readmission rates as a measure of quality is based on the assumption that readmission as the result of a prior hospitalization is a reflection of the quality of care received during that prior hospitalization. Advantages of this measure include its relatively straightforward interpretation, its wide availability, and its ease of collection. Readmission is a more frequent occurrence than mortality which makes statistical significance easier to establish. Readmission rates, however, share the disadvantages of other measures of outcome. A comparison of readmission rates requires an adequate adjustment methodology and it is often difficult to establish whether a particular second admission is a readmission or an admission for a new reason.

The review identified three studies in which readmission rates were examined. For two of these studies, the target population was the Medicare population. None of these studies, however, compared readmission rates among hospitals. Their purposes were to examine the risk factors for readmission and the effects of the prospective payment system on readmissions, or to determine which hospital and physician characteristics were strongly associated with readmission rates.

Adjustment factors used in the studies of readmission rates were the same factors—demographic and medical—that were used in the mortality studies. All of the studies but one adjusted for diagnosis or procedure. Each study attempted to adjust for severity. Various severity measures included the presence of secondary diagnoses, the number of body systems affected, and past contacts with the medical system.

Nosocomial Infection—Nosocomial infection denotes an infection, unrelated to the patient's primary condition, associated with being treated in the hospital. As with hospital readmission, nosocomial infection has not been widely studied as a measure of quality of care nor has it been used to

identify hospital outliers. It is widely accepted, however, that nosocomial infection rates are associated with quality of care. One study showed that 32 percent of the deaths in a consecutive series of 200 were attributable to nosocomial infection as either a principal or contributing cause. Another study found nosocomial infections to be related to postoperative readmission.

Using nosocomial infection as an indicator of quality of care has several drawbacks. First, there are a wide variety of potential infectious agents and an extensive number of anatomical sites which may be infected. Second, it is often difficult to establish that an infection was acquired in the hospital. Third, rates of nosocomial infection are influenced by the intensity of surveillance.

Complications and Disability—Other outcome measures included in the studies reviewed were complication rates and disability rates. The advantages of these outcome measures are that they cover aspects of quality that mortality rates may not be sensitive enough to measure, and they occur more frequently than death. Their disadvantages include the lack of readily available data and the necessity for clinical evaluation of each case to assess the degree of disability or severity of morbidity.

Conclusions

Outcome measures such as rates of readmission and rates of nosocomial infection should provide an important adjunct to mortality rates for assessing hospital quality of care. These outcomes may be more valid indicators of overall hospital quality. In the Medicare population, mortality may be expected for numerous reasons other than poor quality of care. It might reasonably be expected that, in contrast, a substantially greater proportion of readmissions and nosocomial infections are linked to quality. Additionally, these measures are probably more sensitive indicators of quality insofar as mortality reflects only the most severe portion of the spectrum of complications subsequent to therapy. Finally, they have the potential for wider applicability.

More research is needed to establish the usefulness of these measures to identify differences among hospitals in quality of care. No studies directly compared hospitals or attempted to identify hospital outliers. It would seem that a major next step in the development of quality of care indicators would be to show that hospitals that are outliers for mortality rates are also outliers for alternative outcome measures such as readmission rates, nosocomial infection rates, and rates of other complications. This might provide an important validation of mortality as a measure of quality.

To address shortcomings in this area, the following types of analyses are recommended:

- Studies to insure the validity of using readmissions, nosocomial infections and other alternative outcomes and measures of quality of care. These will require a determination of the appropriate patient-level factors requiring adjustment.

- Systematic studies comparing mortality to alternative outcome measures across hospitals, especially the better developed indicators such as rates of readmission and nosocomial infection. These will require efforts to standardize the collection of hospital data for complications of therapy.

- Studies of correlations between various measures of outcome to determine if mortality and other measures of quality of care show agreement. These will include the comparison of hospital outliers using different outcome measures.

- Studies to assess the relative reliability of various outcome measures. These will assess which measure is most stable over time.

Appendix D
Prospective Payment Assessment Commission Extramural Studies

Appendix D. ProPAC Extramural Studies.

TITLE	CONTRACTOR	DATE OF COMPLETION	PROPAC PROJECT OFFICER OR CONTACT
I. MAJOR RESEARCH PROJECTS			
Incremental Costs of Inpatient Care	Rand Corporation	03/89	Jerry Kominski
Transitional Care Study	Lewin & Associates, Inc.	12/88	Judy Moore
Hospital Survey on Transitional Care	American Hospital Association	11/87	Judy Moore
Impact of Selected Management Strategies on Hospital Supply Cost, Use and Access	Lewin & Associates, Inc.	05/87	Candy Littell
Changes in Case Mix and Patient Complexity	Commission on Professional and Hospital Activities	10/87	Jolene Hall
Improving the Definition of Hospital Labor Market Areas and Wage Indexes	Abt Associates	02/87	Jerry Kominski
II. SMALL-SCALE RESEARCH PROJECTS			
Within DRG Case-Complexity Change	Commission on Professional and Hospital Activities	06/88	Laura Dummit
Data on Alternative Financing and Delivery Mechanisms	InterStudy, Inc.	02/88	Judy Moore
The Changing Structure of the Health Care Industry and its Potential Effects	Bernard Friedman, Ph.D.	04/88	Candy Littell
The Feasibility of Conducting a Major Research Project on Changes in Hospital Staffing	Jack Hadley, Ph.D.	01/88	Candy Littell
An Examination of PPS and Excluded Hospital Productivity Trends: 1976-1987	Health Economics Research, Inc.	03/88	Dena Puskin
Assessing Quality Assurance Software Packages	Health Economics Research, Inc.	11/87	Candy Littell
Literature Review: Alternative Measures of Hospital Cost Variation	SysteMetrics/McGraw-Hill, Inc.	12/87	Lisa Potetz

TITLE	CONTRACTOR	DATE OF COMPLETION	PROPAC PROJECT OFFICER OR CONTACT
Small Isolated Rural Hospitals: Identification of Hospitals and Comparison with Sole Community Hospitals	SysteMetrics/McGraw-Hill, Inc.	01/88	Dena Puskin
Assessing the Accuracy of the Medicare Cost Report	SysteMetrics/McGraw-Hill, Inc.	01/88	Karen Perry Lloyd
Analysis of 1980 and 1985 Parts A and B Data	SysteMetrics/McGraw-Hill, Inc.	02/88	Diane Murdock
Institutional Neutrality of Capital Payments	SysteMetrics/McGraw-Hill, Inc.	02/88	Laura Dummit
Developing a Measure of Complexity of Illness Within DRGs	SysteMetrics/McGraw-Hill, Inc.	04/88	Jerry Kominski
Analysis of Hospital Sensitivity to DRG Price Variations in PPS	SysteMetrics/McGraw-Hill, Inc.	06/88	Doreen Denitz Garcia
The Effect of PPS on the Use of Expensive Devices	Project HOPE	12/87	Nancy Merrick
Trends in Concentration of Specialized Procedures Under PPS	Project HOPE	01/88	Nancy Merrick
Evaluating PRO Activities in the Preadmission Review Process	Project HOPE	12/87	Eileen Lake
Estimating the Impact of Scientific and Technological Advances on Increases in Medicare Costs Per Case for FY 1989: Implications for the PPS and Excluded Facility Discretionary Adjustment Factors	Project HOPE	12/87	Dena Puskin
Adjustment Methodologies for Outcome Statistics	Project HOPE	01/88	Jerry Kominski
An Evaluation of Methods for Revising DRG 468	Project HOPE	01/88	Jerry Kominski
Private Sector Cost Containment Efforts	Health Insurance Association of America	09/88	Julie Sochalski
Case-Mix Change: Optimization Model Development	Information Service Center, Inc.	03/87	Dena Puskin
Use of DRGs by State Programs and Blue Cross/ Blue Shield	Research Triangle Institute	03/88	Jolene Hall
Medicare Cost Report Sampling Issues for PPS	Rand Corporation	11/87	Kurt Price

Appendix D. ProPAC Extramural Studies.

TITLE	CONTRACTOR	DATE OF COMPLETION	PROPAC PROJECT OFFICER OR CONTACT
Medicare Benefit Changes from 1980-1987	Alvin Diamond	03/88	Julie Sochalski
Description and Analysis of Medicare Population Eligible for Benefits on the Basis of Disability and ESRD	Alvin Diamond	08/86	Donald Young
An Evaluation of Medicare's Current Method of Allocating Nursing Costs and an Examination of Alternative Approaches	Health Economics Research, Inc.	05/87	Kurt Price
Background Research on the Effects of Medicare PPS on the Quality of Care	Health Economics Research, Inc.	05/86	Candy Littell
Review of Evidence and Literature Relevant to the Development of a Quantitative Foundation for the Discretionary Adjustment Factor	Health Economics Research, Inc.	12/86	Dena Puskin
Studies of the PPS Market Basket: Number of Market Baskets, Effects of Changes in the Minimum Wage Law, the Influence of Hospital Behavior on Forecasts of Wage Increases, and the Measurement of Employee Benefits	Health Economics Research, Inc.	03/87	Lisa Potetz
Analysis of Capital Inclusion in the Hospital Market Basket and Geographic Variation in Fixed Capital Costs	Health Economics Research, Inc.	12/86	Candy Littell
Developing Alternative DRG Classifications for Medicare Cases Involving Cardiac Pacemakers	Project HOPE	08/86	Nancy Merrick
PPS Payments for Expensive Prosthetic and Implantable Devices and Other Medical Supplies	Project HOPE	08/86	Nancy Merrick
Payment Issues for Medicare Discharges Involving Heart Transplantation and Related Services	Project HOPE	08/86	Nancy Merrick
Evaluating the Heterogeneity of DRGs Involving Lymphomas, Leukemias, and Chemotherapy and Developing Alternative Classification(s) of Discharges	Project HOPE	08/86	Nancy Merrick
Review of Evidence and Literature Relevant to the Measurement of Hospital's Case-Mix Index	Project HOPE	12/86	Laura Dummit

Appendix D. ProPAC Extramural Studies.

TITLE	CONTRACTOR	DATE OF COMPLETION	PROPAC PROJECT OFFICER OR CONTACT
Organization and Management of Physician Panels for Developing Generic Improvements in Case-Mix Measurement	Project HOPE	09/86	Jerry Kominski
Effects of PPS on Hospital Financial Position	William Cleverely/Ohio State University	10/85	Dena Puskin
Geographic Variations in Health Care Expenditures	Vanderbilt University & Center for Health Economics Research	12/86	Jerry Kominski
Hospital Managerial Strategies	Nadya Schmavonian	09/86	Candy Littell
Estimates of Hospital Industry Total Factor Productivity for the Period 1970-1986	Health Economics Research, Inc.	06/87	Dena Puskin
Estimates of Productivity and Case-Mix Trends in Excluded Facilities	Health Economics Research, Inc.	06/87	Dena Puskin
Treatment of Hospital Liability Insurance in the PPS Market Basket	Health Economics Research, Inc.	02/87	Lisa Potetz
Estimating the Impact of Scientific and Technological Advances on the Average Cost of a Hospital Admission - Implications for the PPS Discretionary Adjustment Factor	Project HOPE	06/87	Dena Puskin
Estimating the Impact of Scientific and Technological Advances on the Average Cost of an Admission to Excluded Facilities - Implications for the Excluded Hospital Discretionary Adjustment Factor	Project HOPE	07/87	Dena Puskin
Organization and Management of Surgeon Panels for Analyzing the Surgical Hierarchies	Project HOPE	03/87	Jerry Kominski
Analysis of Hospital Financial Indicators	William Cleverely/Ohio State University	12/86	Dena Puskin
Analysis of Issues Related to Capital Expenditures	Johns Hopkins Center for Hospital Finance & Management	01/86	Candy Littell
Difference Between Exempt and PPS Hospitals	Lewin & Associates, Inc.	02/86	Dena Puskin

Appendix D. ProPAC Extramural Studies.

TITLE	CONTRACTOR	DATE OF COMPLETION	PROPAC PROJECT OFFICER OR CONTACT
Factors Contributing to the Vulnerability of Hospitals Under New Medicare Capital Payment Policy	Johns Hopkins Center for Hospital Finance & Management	06/86	Candy Littell
Medicare Cost Report Sampling Issues	Rand Corporation	12/86	Kurt Price
Maryland's Calculation of Per-Diem Costs Effect on DRG Weights	Maryland Health Services Cost Review Commission	12/86	Kurt Price
PRO Quality Assessment Activities	Hodgson & Associates	04/86	Judy Moore
ProPAC Investment Model - Phase I	Lewin & Associates, Inc.	12/86	Candy Littell
ProPAC Investment Model - Phase II	Lewin & Associates, Inc.	08/87	Candy Littell
State Regulation of Subacute Care: A 50 State Survey	Intergovernmental Health Policy Project, George Washington University	12/86	Judy Moore
State Use of DRG-Based Systems	Zimmerman Consulting	04/86	Dena Puskin
The Efforts Undertaken by Hospitals in Preparing for Major Capital Expenditures	Johns Hopkins Center for Hospital Finance & Management	08/86	Candy Littell

Appendix E
Medicare DRGs and Weights for Fiscal Year 1988

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
1	1	SURG	CRANIOTOMY AGE >17 EXCEPT FOR TRAUMA	3.5610	3.4434	-3.3
2	1	SURG	CRANIOTOMY FOR TRAUMA AGE >17	3.8111	3.8160	0.1
3	1	SURG	CRANIOTOMY AGE 0-17	2.9183	2.9183	0.0
4	1	SURG	SPINAL PROCEDURES	2.7296	2.5904	-5.1
5	1	SURG	EXTRACRANIAL VASCULAR PROCEDURES	1.6508	1.5685	-5.0
6	1	SURG	CARPAL TUNNEL RELEASE	0.4073	0.4393	7.9
7	1	SURG	PERIPH & CRANIAL NERVE & OTHER NERV SYST PROC WITH CC	1.3866	2.5269	82.2
8	1	SURG	PERIPH & CRANIAL NERVE & OTHER NERV SYST PROC W/O CC	0.7464	0.7367	-1.3
9	1	MED	SPINAL DISORDERS & INJURIES	1.4235	1.2639	-11.2
10	1	MED	NERVIOUS SYSTEM NEOPLASMS WITH CC	1.1322	1.2123	7.1
11	1	MED	NERVOUS SYSTEM NEOPLASMS W/O CC	0.9338	0.7729	-17.2
12	1	MED	DEGENERATIVE NERVOUS SYSTEM DISORDERS	1.0001	0.9459	-5.4
13	1	MED	MULTIPLE SCLEROSIS & CEREBELLAR ATAXIA	0.9790	0.9324	-4.8
14	1	MED	SPECIFIC CEREBROVASCULAR DISORDERS EXCEPT TIA	1.3143	1.2429	-5.4
15	1	MED	TRANSIENT ISCHEMIC ATTACK & PRECEREBRAL OCCLUSIONS	0.6241	0.6293	0.8
16	1	MED	NONSPECIFIC CEREBROVASCULAR DISORDERS WITH CC	0.9042	1.0384	14.8
17	1	MED	NONSPECIFIC CEREBROVASCULAR DISORDERS W/O CC	0.6802	0.6358	-6.5
18	1	MED	CRANIAL & PERIPHERAL NERVE DISORDERS WITH CC	0.7566	0.9557	26.3
19	1	MED	CRANIAL & PERIPHERAL NERVE DISORDERS W/O CC	0.6549	0.6158	-6.0
20	1	MED	NERVOUS SYSTEM INFECTION EXCEPT VIRAL MENINGITIS	1.4087	1.6220	15.1
21	1	MED	VIRAL MENINGITIS	1.3143	1.3613	3.6
22	1	MED	HYPERTENSIVE ENCEPHALOPATHY	0.7086	0.7055	-0.4
23	1	MED	NONTRAUMATIC STUPOR & COMA	1.1239	0.9505	-15.4
24	1	MED	SEIZURE & HEADACHE AGE >17 WITH CC	0.7642	0.9228	20.8
25	1	MED	SEIZURE & HEADACHE AGE >17 W/O CC	0.5520	0.5386	-2.4
26	1	MED	SEIZURE & HEADACHE AGE 0-17	0.6255	0.5635	-9.9
27	1	MED	TRAUMATIC STUPOR & COMA, COMA >1 HR	1.5645	1.4753	-5.7
28	1	MED	TRAUMATIC STUPOR & COMA, COMA <1 HR AGE >17 WITH CC	0.9422	1.1694	24.1
29	1	MED	TRAUMATIC STUPOR & COMA, COMA <1 HR AGE >17 W/O CC	0.6462	0.5856	-9.4
30	1	MED	TRAUMATIC STUPOR & COMA, COMA <1 HR AGE 0-17	0.3539	0.3539	0.0
31	1	MED	CONCUSSION AGE >17 WITH CC	0.5381	0.6550	21.7
32	1	MED	CONCUSSION AGE >17 W/O CC	0.4064	0.4005	-1.5
33	1	MED	CONCUSSION AGE 0-17	0.2457	0.2457	0.0
34	1	MED	OTHER DISORDERS OF NERVOUS SYSTEM WITH CC	0.9761	1.2038	23.3
35	1	MED	OTHER DISORDERS OF NERVOUS SYSTEM W/O CC	0.7383	0.6035	-18.3

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
36	2	SURG	RETINAL PROCEDURES	0.7101	0.6820	-4.0
37	2	SURG	ORBITAL PROCEDURES	0.6687	0.7104	6.2
38	2	SURG	PRIMARY IRIS PROCEDURES	0.3963	0.3779	-4.6
39	2	SURG	LENS PROCEDURES WITH OR WITHOUT VITRECTOMY	0.5719	0.5167	-9.7
40	2	SURG	EXTRAOCULAR PROCEDURES EXCEPT ORBIT AGE >17	0.4133	0.4675	13.1
41	2	SURG	EXTRAOCULAR PROCEDURES EXCEPT ORBIT AGE 0-17	0.3657	0.3657	0.0
42	2	SURG	INTRAOCULAR PROCEDURES RETINA, IRIS & LENS	0.6542	0.6600	0.9
43	2	MED	HYPHEMA	0.3461	0.3727	7.7
44	2	MED	ACUTE MAJOR EYE INFECTIONS	0.6395	0.6352	-0.7
45	2	MED	NEUROLOGICAL EYE DISORDERS	0.5407	0.5595	3.5
46	2	MED	OTHER DISORDERS OF THE EYE AGE >17 WITH CC	0.6009	0.6195	3.1
47	2	MED	OTHER DISORDERS OF THE EYE AGE >17 W/O CC	0.4187	0.3611	-13.8
48	2	MED	OTHER DISORDERS OF THE EYE AGE 0-17	0.4018	0.4018	0.0
49	3	SURG	MAJOR HEAD & NECK PROCEDURES	2.8742	2.8923	0.6
50	3	SURG	SIALOADENECTOMY	0.7033	0.6681	-5.0
51	3	SURG	SALIVARY GLAND PROCEDURES EXCEPT SIALOADENECTOMY	0.5878	0.5424	-7.7
52	3	SURG	CLEFT LIP & PALATE REPAIR	0.6955	0.7033	1.1
53	3	SURG	SINUS & MASTOID PROCEDURES AGE >17	0.6175	0.6159	-0.3
54	3	SURG	SINUS & MASTOID PROCEDURES AGE 0-17	0.6889	0.6889	0.0
55	3	SURG	MISCELLANEOUS EAR, NOSE & THROAT PROCEDURES	0.4342	0.4598	5.9
56	3	SURG	RHINOPLASTY	0.4357	0.4471	2.6
57	3	SURG	T&A PROC, EXCEPT TONSILLECTOMY &/OR ADENDIDECTOMY ONLY, AGE >17	0.7717	0.7907	2.5
58	3	SURG	T&A PROC, EXCEPT TONSILLECTOMY &/OR ADENDIDECTOMY ONLY, AGE 0-17	0.3097	0.3097	0.0
59	3	SURG	TONSILLECTOMY &/OR ADENOIDECTOMY ONLY, AGE >17	0.4130	0.3845	-6.9
60	3	SURG	TONSILLECTOMY &/OR ADENOIDECTOMY ONLY, AGE 0-17	0.2616	0.2616	0.0
61	3	SURG	MYRINGOTOMY W TUBE INSERTION AGE >17	0.4273	0.5401	26.4
62	3	SURG	MYRINGOTOMY W TUBE INSERTION AGE 0-17	0.3089	0.3089	0.0
63	3	SURG	OTHER EAR, NOSE & THROAT O.R. PROCEDURES	1.1618	1.1538	-0.7
64	3	MED	EAR, NOSE & THROAT MALIGNACY	0.9769	1.0548	8.0
65	3	MED	DYSEQUILIBRIUM	0.4500	0.4600	2.2
66	3	MED	EPISTAXIS	0.4144	0.4272	3.1
67	3	MED	EPIGLOTTITIS	0.9363	0.9964	6.4
68	3	MED	OTITIS MEDIA & URI AGE >17 WITH CC	0.6088	0.7217	18.5
69	3	MED	OTITIS MEDIA & URI AGE >17 W/O CC	0.5040	0.5366	6.5
70	3	MED	OTITIS MEDIA & URI AGE 0-17	0.5251	0.5345	1.8

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
71	3	MED	LARYNGOTRACHEITIS	0.6582	0.6026	-8.4
72	3	MED	NASAL TRAUMA & DEFORMITY	0.5216	0.4895	-6.2
73	3	MED	OTHER EAR, NOSE & THROAT DIAGNOSES AGE >17	0.6045	0.7404	22.5
74	3	MED	OTHER EAR, NOSE & THROAT DIAGNOSES AGE 0-17	0.3427	0.3427	0.0
75	4	SURG	MAJOR CHEST PROCEDURES	2.9776	3.0258	1.6
76	4	SURG	OTHER RESP SYSTEM O.R. PROCEDURES WITH CC	2.5663	2.0885	-18.6
77	4	SURG	OTHER RESP SYSTEM O.R. PROCEDURES W/O CC	1.6734	1.0970	-34.4
78	4	MED	PULMONARY EMBOLISM	1.4798	1.4817	0.1
79	4	MED	RESPIRATORY INFECTIONS & INFLAMMATIONS AGE >17 WITH CC	1.9344	2.0777	7.4
80	4	MED	RESPIRATORY INFECTIONS & INFLAMMATIONS AGE >17 W/O CC	1.4387	1.3341	-7.3
81	4	MED	RESPIRATORY INFECTIONS & INFLAMMATIONS AGE 0-17	0.8652	1.1032	27.5
82	4	MED	RESPIRATORY NEOPLASMS	1.1258	1.1899	5.7
83	4	MED	MAJOR CHEST TRAUMA WITH CC	0.8397	0.9698	15.5
84	4	MED	MAJOR CHEST TRAUMA W/O CC	0.5920	0.5372	-9.3
85	4	MED	PLEURAL EFFUSION WITH CC	1.1196	1.1451	2.3
86	4	MED	PLEURAL EFFUSION W/O CC	0.9761	0.7720	-20.9
87	4	MED	PULMONARY EDEMA & RESPIRATORY FAILURE	1.8076	1.5691	-13.2
88	4	MED	CHRONIC OBSTRUCTIVE PULMONARY DISEASE	1.0768	1.1263	4.6
89	4	MED	SIMPLE PNEUMONIA & PLEURISY AGE >17 WITH CC	1.1657	1.2862	10.3
90	4	MED	SIMPLE PNEUMONIA & PLEURISY AGE >17 W/O CC	0.8842	0.8961	1.3
91	4	MED	SIMPLE PNEUMONIA & PLEURISY AGE 0-17	0.7914	0.9448	19.4
92	4	MED	INTERSTITIAL LUNG DISEASE WITH CC	1.1115	1.2821	15.3
93	4	MED	INTERSTITIAL LUNG DISEASE W/O CC	0.8641	0.8264	-4.4
94	4	MED	PNEUMOTHORAX WITH CC	1.3044	1.3954	7.0
95	4	MED	PNEUMOTHROAX W/O CC	0.8796	0.7571	-13.9
96	4	MED	BRONCHITIS & ASTHMA AGE >17 WITH CC	0.8446	0.9804	16.1
97	4	MED	BRONCHITIS & ASTHMA AGE >17 W/O CC	0.7091	0.7151	0.8
98	4	MED	BRONCHITIS & ASTHMA AGE 0-17	0.7201	0.5744	-20.2
99	4	MED	RESPIRATORY SIGNS & SYMPTOMS WITH CC	0.8072	0.7803	-3.3
100	4	MED	RESPIRATORY SIGNS & SYMPTOMS W/O CC	0.6253	0.5238	-16.2
101	4	MED	OTHER RESPIRATORY SYSTEM DIAGNOSES WITH CC	0.8460	0.9585	13.3
102	4	MED	OTHER RESPIRATORY SYSTEM DIAGNOSES W/O CC	0.6841	0.6625	-3.2
103	5	SURG	HEART TRANSPLANT	0.0000	11.9225	NA
104	5	SURG	CARDIAC VALVE PROCEDURE W PUMP & W CARDIAC CATH	7.3151	7.3424	0.4
105	5	SURG	CARDIAC VALVE PROCEDURE W PUMP & W/O CARDIAC CATH	6.3388	5.7811	-8.8

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
106	5	SURG	CORONARY BYPASS WITH CARDIAC CATH	5.3324	5.5415	3.9
107	5	SURG	CORONARY BYPASS W/O CARDIAC CATH	4.6608	4.2858	-8.0
108	5	SURG	OTHER CARDIOTHORACIC OR VASCULAR PROCEDURES, WITH PUMP	4.7803	5.3703	12.3
109	5	SURG	OTHER CARDIOTHORACIC PROCEDURES W/O PUMP	4.3579	3.9142	-10.2
110	5	SURG	MAJOR RECONSTRUCTIVE VASCULAR PROC W/O PUMP WITH CC	3.3118	3.6718	10.9
111	5	SURG	MAJOR RECONSTRUCTIVE VASCULAR PROC W/O PUMP W/O CC	2.4549	2.2639	-7.8
112	5	SURG	VASCULAR PROCEDURES EXCEPT MAJOR RECONSTRUCTION W/O PUMP	2.2055	1.8911	-14.3
113	5	SURG	AMPUTATION FOR CIRC SYSTEM DISORDERS EXCEPT UPPER LUMB & TOE	2.5345	2.4590	-3.0
114	5	SURG	UPPER LIMB & TOE AMPUTATION FOR CIRC SYSTEM DISORDERS	1.8918	1.7040	-9.9
115	5	SURG	PERM CARDIAC PACEMAKER IMPLANT W AMI, HEART FAILURE OR SHOCK	4.1727	4.0516	-2.9
116	5	SURG	PERM CARDIAC PACEMAKER IMPLANT W/O AMI HEART FAILURE OR SHOCK	2.9868	2.7694	-7.3
117	5	SURG	CARDIAC PACEMAKER REPLACE & REVIS EXCEPT PULSE GEN REPLACEMENT	1.2989	1.2261	-5.6
118	5	SURG	CARDIAC PACEMAKER PULSE GENERATOR REPLACEMENT	1.9224	1.7563	-8.6
119	5	SURG	VEIN LIGATION & STRIPPING	0.9164	0.8692	-5.2
120	5	SURG	OTHER CIRCULATORY SYSTEM O.R. PROCEDURES	2.2577	2.4776	9.7
121	5	MED	CIRCULATORY DISORDERS W AMI & C.V. COMP, DISCH ALIVE	1.7687	1.7162	-3.0
122	5	MED	CIRCULATORY DISORDERS W AMI W/O C.V. COMP, DISCH ALIVE	1.3267	1.2002	-9.5
123	5	MED	CIRCULATORY DISORDERS W AMI, EXPIRED	1.3522	1.3979	3.4
124	5	MED	CIRCULATORY DISORDERS EXCEPT AMI, W CARD CATH & COMPLEX DIAG	1.2551	1.1806	-5.9
125	5	MED	CIRCULATORY DISORDERS EXCEPT AMI, W CARD CATH W/O COMPLEX DIAG	0.7265	0.6884	-5.2
126	5	MED	ACUTE & SUBACUTE ENDOCARDITIS	2.9836	3.0575	2.5
127	5	MED	HEART FAILURE & SHOCK	1.0098	1.0222	1.2
128	5	MED	DEEP VEIN THROMBOPHLEBITIS	0.8456	0.8513	0.7
129	5	MED	CARDIAC ARREST, UNEXPLAINED	1.7199	1.5715	-8.6
130	5	MED	PERIPHERAL VASCULAR DISORDERS WITH CC	0.8251	0.8776	6.4
131	5	MED	PERIPHERAL VASCULAR DISORDERS W/O CC	0.6705	0.5862	-12.6
132	5	MED	ATHEROSCLEROSIS WITH CC	0.8037	0.7976	-0.8
133	5	MED	ATHEROSCLEROSIS W/O CC	0.7049	0.5997	-14.9
134	5	MED	HYPERTENSION	0.6363	0.6088	-4.3
135	5	MED	CARDIAC CONGENITAL & VALVULAR DISORDERS AGE >17 WITH CC	0.8937	0.9221	3.2
136	5	MED	CARDIAC CONGENITAL & VALVULAR DISORDERS AGE > 17 W/O CC	0.7525	0.6103	-18.9
137	5	MED	CARDIAC CONGENITAL & VALVULAR DISORDERS AGE 0-17	0.6315	0.6315	0.0
138	5	MED	CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS WITH CC	0.8136	0.8535	4.9
139	5	MED	CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS W/O CC	0.6514	0.5912	-9.2
140	5	MED	ANGINA PECTORIS	0.6894	0.6689	-3.0

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
141	5	MED	SYNCOPE & COLLAPSE WITH CC	0.6187	0.6801	9.9
142	5	MED	SYNCOPE & COOLAPSE W/O CC	0.5335	0.5244	-1.7
143	5	MED	CHEST PAIN	0.5893	0.5500	-6.7
144	5	MED	OTHER CIRCULATORY SYSTEM DIAGNOSES WITH CC	1.1160	1.1449	2.6
145	5	MED	OTHER CIRCULATORY SYSTEM DIAGNOSES W/O CC	0.8475	0.6689	-21.1
146	6	SURG	RECTAL RESECTION WITH CC	3.0751	3.4379	11.8
147	6	SURG	RECTAL RESECTION W/O CC	2.2735	2.1344	-6.1
148	6	SURG	MAJOR SMALL & LARGE BOWEL PROCEDURES WITH CC	2.9401	3.2376	10.1
149	6	SURG	MAJOR SMALL & LARGE BOWEL PROCEDURES W/O CC	2.1069	1.8341	-12.9
150	6	SURG	PERITONEAL ADHESIOLYSIS WITH CC	2.3426	2.6797	14.4
151	6	SURG	PERITONEAL ADHESIOLYSIS W/O CC	1.5900	1.4885	-6.4
152	6	SURG	MINOR SMALL & LARGE BOWEL PROCEDURES WITH CC	1.4059	1.5988	13.7
153	6	SURG	MINOR SMALL & LARGE BOWEL PROCEDURES W/O CC	1.0992	1.0566	-3.9
154	6	SURG	STOMACH, ESOPHAGEAL & DUODENAL PROCEDURES AGE >17 WITH CC	2.6876	3.7961	41.2
155	6	SURG	STOMACH, ESOPHAGEAL & DUODENAL PROCEDURES AGE >17 W/O CC	1.7902	1.8195	1.6
156	6	SURG	STOMACH, ESOPHAGEAL & DUODENAL PROCEDURES AGE 0-17	0.8382	0.8382	0.0
157	6	SURG	ANAL & STOMAL PROCEDURES WITH CC	0.7302	0.9324	27.7
158	6	SURG	ANAL & STOMAL PROCEDURES W/O CC	0.5511	0.5449	-1.1
159	6	SURG	HERNIA PROCEDURES EXCEPT INGUINAL & FEMORAL AGE >17 WITH CC	0.9997	1.1454	14.6
160	6	SURG	HERNIA PROCEDURES EXCEPT INGUINAL & FEMORAL AGE >17 W/O CC	0.7457	0.6810	-8.7
161	6	SURG	INGUINAL & FEMORAL HERNIA PROCEDURES AGE >17 WITH CC	0.6536	0.7541	15.4
162	6	SURG	INGUINAL & FEMORAL HERNIA PROCEDURES AGE >17 W/O CC	0.5261	0.5004	-4.9
163	6	SURG	HERNIA PROCEDURES AGE 0-17	0.9647	0.7717	-20.0
164	6	SURG	APPENDECTOMY W COMPLICATED PRINCIPAL DIAG WITH CC	2.0646	2.4014	16.3
165	6	SURG	APPENDECTOMY W COMPLICATED PRINCIPAL DIAG W/O CC	1.4375	1.4675	2.1
166	6	SURG	APPENDECTOMY W/O COMPLICATED PRINCIPAL DIAG WITH CC	1.3604	1.4954	9.9
167	6	SURG	APPENDECTOMY W/O COMPLICATED PRINCIPAL DIAL W/O CC	0.8872	0.8651	-2.5
168	6	SURG	MOUTH PROCEDURES WITH CC	0.9182	1.4067	53.2
169	6	SURG	MOUTH PROCEDURES W/O CC	0.6580	0.6689	1.7
170	6	SURG	OTHER DIGESTIVE SYSTEM O.R. PROCEDURES WITH CC	2.7611	2.7316	-1.1
171	6	SURG	OTHER DIGESTIVE SYSTEM O.R. PROCEDURES W/O CC	2.3295	1.4018	-39.8
172	6	MED	DIGESTIVE MALIGNANCY WITH CC	1.0748	1.1861	10.4
173	6	MED	DIGESTIVE MALIGNANCY W/O CC	0.9602	0.7049	-26.6
174	6	MED	G.I. HEMORRHAGE WITH CC	0.9073	0.9878	8.9
175	6	MED	G.I. HEMORRHAGE W/O CC	0.7067	0.6600	-6.6

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
176	6	MED	COMPLICATED PEPTIC ULCER	0.9316	0.9964	7.0
177	6	MED	UNCOMPLICATED PEPTIC ULCER WITH CC	0.6615	0.7834	18.4
178	6	MED	UNCOMPLICATED PEPTIC ULCER W/O CC	0.5554	0.5838	5.1
179	6	MED	INFLAMMATORY BOWEL DISEASE	0.9875	1.0416	5.5
180	6	MED	G.I. OBSTRUCTION WITH CC	0.7583	0.9150	20.7
181	6	MED	G.I. OBSTRUCTION W/O CC	0.5827	0.5415	-7.1
182	6	MED	ESOPHAGITIS, GASTROENT & MISC DIGEST DISORDERS AGE >17 WITH CC	0.6032	0.7224	19.8
183	6	MED	ESOPHAGITIS, GASTROENT & MISC DIGEST DISORDERS AGE >17 W/O CC	0.5104	0.5252	2.9
184	6	MED	ESOPHAGITIS, GASTROENT & MISC DIGEST DISORDERS AGE 0-17	0.4828	0.4223	-12.5
185	6	MED	DENTAL & ORAL DIS EXCEPT EXTRACTIONS & RESTORATIONS, AGE >17	0.7147	0.7530	5.4
186	6	MED	DENTAL & ORAL DIS EXCEPT EXTRACTIONS & RESTORATIONS, AGE 0-17	0.4112	0.4112	0.0
187	6	MED	DENTAL EXTRACTIONS & RESTORATIONS	0.4209	0.4540	7.9
188	6	MED	OTHER DIGESTIVE SYSTEM DIAGNOSES AGE >17 WITH CC	0.7171	0.9144	27.5
189	6	MED	OTHER DIGESTIVE SYSTEM DIAGNOSES AGE >17 W/O CC	0.5260	0.4966	-5.6
190	6	MED	OTHER DIGESTIVE SYSTEM DIAGNOSES AGE 0-17	0.9178	0.8147	-11.2
191	7	SURG	MAJOR PANCREAS, LIVER & SHUNT PROCEDURES	4.4603	4.6881	5.1
192	7	SURG	MINOR PANCREAS, LIVER & SHUNT PROCEDURES	4.0437	3.8625	-4.5
193	7	SURG	BILIARY TRACT PROC EXCEPT TOT CHOLECYSTECTOMY WITH CC	2.8115	3.0252	7.6
194	7	SURG	BILIARY TRACT PROC EXCEPT TOT CHOLECYSTECTOMY W/O CC	2.1204	1.8505	-12.7
195	7	SURG	TOTAL CHOLECYSTECTOMY W C.D.E. WITH CC	2.2724	2.3854	5.0
196	7	SURG	TOTAL CHOLECYSTECTOMY W C.D.E. W/O CC	1.5974	1.6898	5.8
197	7	SURG	TOTAL CHOLECYSTECTOMY W/O C.D.E. WITH CC	1.7055	1.8768	10.0
198	7	SURG	TOTAL CHOLECYSTECTOMY W/O C.D.E. W/O CC	1.1399	1.1152	-2.2
199	7	SURG	HEPATOBILIARY DIAGNOSTIC PROCEDURE FOR MALIGNANCY	2.3379	2.2693	-2.9
200	7	SURG	HEPATOBILIARY DIAGNOSTIC PROCEDURE FOR NON-MALIGNANCY	2.6281	2.4731	-5.9
201	7	SURG	OTHER HEPATOBILIARY OR PANCREAS O.R. PROCEDURES	2.7125	2.3933	-11.8
202	7	MED	CIRRHOSIS & ALCOHOLIC HEPATITIS	1.1665	1.2075	3.5
203	7	MED	MALIGNANCY OF HEPATOBILIARY SYSTEM OR PANCREAS	1.0338	1.0422	0.8
204	7	MED	DISORDERS OF PANCREAS EXCEPT MALIGNANCY	0.9698	1.0269	5.9
205	7	MED	DISORDERS OF LIVER EXCEPT MALIG, CIRR, ALC HEPA WITH CC	1.0718	1.2132	13.2
206	7	MED	DISORDERS OF LIVER EXCEPT MALIG, CIRR, ALC HEPA W/O CC	0.7735	0.6806	-12.0
207	7	MED	DISORDERS OF THE BILIARY TRACT WITH CC	0.7775	0.9243	18.9
208	7	MED	DISORDERS OF THE BILIARY TRACT W/O CC	0.8793	0.5816	-33.9
209	8	SURG	MAJOR JOINT & LIMB REATTACHMENT PROCEDURES	2.3925	2.4145	0.9
210	8	SURG	HIP & FEMUR PROCEDURES EXCEPT MAJOR JOINT AGE >17 WITH CC	2.0317	2.1776	7.2

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
211	8	SURG	HIP & FEMUR PROCEDURES EXCEPT MAJOR JOINT AGE >17 W/O CC	1.7866	1.6104	-9.9
212	8	SURG	HIP & FEMUR PROCEDURES EXCEPT MAJOR JOINT AGE 0-17	1.6608	1.3764	-17.1
213	8	SURG	AMPUTATION FOR MUSCULOSKELETAL SYSTEM & CONN TISSUE DISORDERS	1.9750	1.8460	-6.5
214	8	SURG	BACK & NECK PROCEDURES WITH CC	1.8749	2.1385	14.1
215	8	SURG	BACK & NECK PROCEDURES W/O CC	1.4275	1.3768	-3.6
216	8	SURG	BIOPSIES OF MUSCELOSKELETAL SYSTEM & CONNECTIVE TISSUE	1.5565	1.5973	2.6
217	8	SURG	WND DEBRID & SKN GRFT EXCEPT HAND, FOR MUSCSKELET & TISS DIS	2.3097	2.8155	21.9
218	8	SURG	LOWER EXTREM & HUMER PROC EXCEPT HIP, FOOT, FEMUR AGE >17 W CC	1.3797	1.6224	17.6
219	8	SURG	LOWER EXTREM & HUMER PROC EXCEPT HIP, FOOT, FEMUR AGE >17 W/O CC	1.0436	1.0186	-2.4
220	8	SURG	LOWER EXTREM & HUMER PROC EXCEPT HIP, FOOT, FEMUR AGE 0-17	0.9242	0.9242	0.0
221	8	SURG	KNEE PROCEDURES WITH CC	1.0141	1.4523	43.2
222	8	SURG	KNEE PROCEDURES W/O CC	0.7262	0.7995	10.1
223	8	SURG	MAJOR SHOULDER OR ELBOW PROC, OR OTHER UPPER EXTREMITY PROC, W CC	1.2263	1.1202	-8.7
224	8	SURG	SHOULDER, ELBOW OR FOREARM PROC, EXC MAJOR JOINT PROC, W/O CC	0.6894	0.6588	-4.4
225	8	SURG	FOOT PROCEDURES	0.6552	0.6775	3.4
226	8	SURG	SOFT TISSUE PROCEDURES WITH CC	0.8783	1.3570	54.5
227	8	SURG	SOFT TISSUE PROCEDURES W/O CC	0.6673	0.6878	3.1
228	8	SURG	MAJOR THUMB OR JOINT PROC, OR OTH HAND OR WRIST PROC, WITH CC	0.6100	0.8201	34.4
229	8	SURG	HAND OR WRIST PROC, EXCEPT MAJOR JOINT PROC, W/O CC	0.4993	0.5202	4.2
230	8	SURG	LOCAL EXCISION & REMOVAL OF INT FIX DEVICES OF HIP & FEMUR	1.0156	0.8868	-12.7
231	8	SURG	LOCAL EXCISION & REMOVAL OF INT FIX DEVICES EXCEPT HIP & FEMUR	0.7381	0.8346	13.1
232	8	SURG	ARTHROSCOPY	0.6723	0.8603	28.0
233	8	SURG	OTHER MUSCULOSKELET SYS & CONN TISS O.R. PROC WITH CC	1.3898	1.7267	24.2
234	8	SURG	OTHER MUSCULOSKELET SYS & CONN TISS O.R. PROC W/O CC	0.9517	0.9057	-4.8
235	8	MED	FRACTURES OF FEMUR	1.4136	1.2060	-14.7
236	8	MED	FRACTURES OF HIP & PELVIS	1.0712	0.9036	-15.6
237	8	MED	SPRAINS, STRAINS, & DISLOCATIONS OF HIP, PELVIS & THIGH	0.6049	0.5959	-1.5
238	8	MED	OSTEOMYELITIS	1.6471	1.6579	0.7
239	8	MED	PATHOLOGICAL FRACTURES & MUSCULOSKELETAL & CONN TISS MALIGNANCY	0.9268	0.9550	3.0
240	8	MED	CONNECTIVE TISSUE DISORDERS WITH CC	0.9047	1.0932	20.8
241	8	MED	CONNECTIVE TISSUE DISORDERS W/O CC	0.7463	0.6644	-11.0
242	8	MED	SEPTIC ARTHRITIS	1.4562	1.4100	-3.2
243	8	MED	MEDICAL BACK PROBLEMS	0.6840	0.6694	-2.1
244	8	MED	BONE DISEASES & SPECIFIC ARTHROPATHIES WITH CC	0.6742	0.7305	8.4
245	8	MED	BONE DISEASES & SPECIFIC ARTHROPATHIES W/O CC	0.6400	0.5345	-16.5

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
246	8	MED	NON-SPECIFIC ARTHROPATHIES	0.5935	0.5769	-2.8
247	8	MED	SIGNS & SYMPTOMS OF MUSCULOSKELETAL SYSTEM & CONN TISSUE	0.5793	0.5407	-6.7
248	8	MED	TENDONITIS MYOSITIS & BURSITIS	0.5892	0.6097	3.5
249	8	MED	AFTERCARE MUSCULOSKELETAL SYSTEM & CONNECTIVE TISSUE	0.7875	0.6830	-13.3
250	8	MED	FX, SPRN, STRNS & DISL OF FOREARM HAND FOOT AGE >17 WITH CC	0.5158	0.6721	30.3
251	8	MED	FX, SPRN, STRNS & DISL OF FOREARM HAND FOOT AGE >17 W/O CC	0.4003	0.4148	3.6
252	8	MED	FX, SPRN, STRNS & DISL OF UPARM LOWLEG EX FOOT AGE 0-17	0.3496	0.3496	0.0
253	8	MED	FX, SPRN, STRNS & DISL OF WPARM LOWLEG EX FOOT AGE >17 WITH CC	0.6321	0.7909	25.1
254	8	MED	FX, SPRN, STRNS & DISL OF WPARM LOWLEG EX FOOT AGE >17 W/O CC	0.4929	0.4557	-7.5
255	8	MED	FX, SPRN, STRNS & DISL OR UPARM LOWLEG EX FOOT AGE 0-17	0.4638	0.4638	0.0
256	8	MED	OTHER MUSCULOSKELETAL SYSTEM & CONNECTIVE TISSUE DIAGNOSES	0.6991	0.6585	-5.8
257	9	SURG	TOTAL MASTECTOMY FOR MALIGNANCY WITH CC	1.0630	1.0448	-1.7
258	9	SURG	TOTAL MASTECTOMY FOR MALIGNANCY W/O CC	0.9696	0.8462	-12.7
259	9	SURG	SUBTOTAL MASTECTOMY FOR MALIGNANCY WITH CC	0.8605	1.0046	16.7
260	9	SURG	SUBTOTAL MASTECTOMY FOR MALIGNANCY W/O CC	0.6659	0.6010	-9.7
261	9	SURG	BREAST PROC FOR NON-MALIGNANCY EXCEPT BIOPSY & LOCAL EXCISION	0.6104	0.6204	1.6
262	9	SURG	BREAST BIOPSY & LOCAL EXCISION FOR NON-MALIGNANCY	0.4252	0.4312	1.4
263	9	SURG	SKIN GRAFT &/OR DEBRID FOR SKN ULCER OR CELLULITIS WITH CC	2.4173	2.5967	7.4
264	9	SURG	SKIN GRAFT &/OR DEBRID FOR SKN ULCER OR CELLULITIS W/O CC	2.1798	1.6179	-25.8
265	9	SURG	SKIN GRAFT &/OR DEBRID EXCEPT FOR SKIN ULCER OR CELLULITIS W CC	1.3967	1.3909	-0.4
266	9	SURG	SKIN GRAFT &/OR DEBRID EXCEPT FOR SKIN ULCER OR CELLULITIS W/O CC	0.7313	0.6865	-6.1
267	9	SURG	PERIANAL & PILONIDAL PROCEDURES	0.6360	0.6248	-1.8
268	9	SURG	SKIN, SUBCUTANEOUS TISSUE & BREAST PLASTIC PROCEDURES	0.5657	0.5934	4.9
269	9	SURG	OTHER SKIN, SUBCUT TISS & BREAST O.R. PROC WITH CC	1.1334	1.5177	33.9
270	9	SURG	OTHER SKIN, SUBCUT TISS & BREAST O.R. PROC W/O CC	0.7622	0.6834	-10.3
271	9	MED	SKIN ULCERS	1.2612	1.2017	-4.7
272	9	MED	MAJOR SKIN DISORDERS WITH CC	0.8524	1.0375	21.7
273	9	MED	MAJOR SKIN DISORDERS W/O CC	0.7971	0.7247	-9.1
274	9	MED	MALIGNANT BREAST DISORDERS WITH CC	1.0367	1.0494	1.2
275	9	MED	MALIGNANT BREAST DISORDERS W/O CC	0.9880	0.6395	-35.3
276	9	MED	NON-MALIGNAT BREAST DISORDERS	0.5677	0.5245	-7.6
277	9	MED	CELLULITIS AGE >17 WITH CC	0.8861	0.9695	9.4
278	9	MED	CELLULITIS AGE >17 W/O CC	0.7582	0.7063	-6.8
279	9	MED	CELLULITIS AGE 0-17	0.4739	0.7367	55.5
280	9	MED	TRAUMA TO THE SKIN, SUBCUT TISS & BREAST AGE >17 WITH CC	0.5414	0.6197	14.5

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
281	9	MED	TRAUMA TO THE SKIN SUBCUT TISS & BREAST AGE >17 W/O CC	0.4467	0.4306	-3.6
282	9	MED	TRAUMA TO THE SKIN SUBCUT TISS & BREAST AGE 0-17	0.3424	0.3424	0.0
283	9	MED	MINOR SKIN DISORDERS WITH CC	0.6365	0.7682	20.7
284	9	MED	MINOR SKIN DISORDERS W/O CC	0.5170	0.4795	-7.3
285	10	SURG	AMPUTAT OF LOWER LIMB FOR ENDOC., NUTRIT, & METABOL DISORDERS	3.2719	2.9919	-8.6
286	10	SURG	ADRENAL & PITUITARY PROCEDURES	2.6727	2.7063	1.3
287	10	SURG	SKIN GRAFTS & WOUNDS DEBRID FOR ENDOC, NUTRIT, & METAB DISORDERS	2.3776	2.2274	-6.3
288	10	SURG	O.R. PROCEDURES FOR OBESITY	2.1128	2.0018	-5.3
289	10	SURG	PARATHYROID PROCEDURES	1.3304	1.1470	-13.8
290	10	SURG	THYROID PROCEDURES	0.8561	0.8428	-1.6
291	10	SURG	THYROGLOSSAL PROCEDURES	0.6072	0.4991	-17.8
292	10	SURG	OTHER ENDOCRINE, NUTRIT & METAB O.R. PROC WITH CC	2.3129	2.6027	12.5
293	10	SURG	OTHER ENDOCRINE, NUTRIT & METAB O.R. PROC W/O CC	1.7960	1.1698	-34.9
294	10	MED	DIABETES AGE >35	0.7454	0.7493	0.5
295	10	MED	DIABETES AGE 0-35	0.7886	0.7228	-8.3
296	10	MED	NUTRITIONAL & MISC METABOLIC DISORDERS AGE >17 WITH CC	0.8271	0.9259	11.9
297	10	MED	NUTRITIONAL & MISC METABOLIC DISORDERS AGE >17 W/O CC	0.6984	0.5791	-17.1
298	10	MED	NUTRITIONAL & MISC METABOLIC DISORDERS AGE 0-17	0.7203	0.7065	-1.9
299	10	MED	INBORN ERROR OF METABOLISM	0.8041	0.8271	2.9
300	10	MED	ENDOCRINE DISORDERS WITH CC	0.9348	1.0862	16.2
301	10	MED	ENDOCRINE DISORDERS W/O CC	0.6882	0.6758	-1.8
302	11	SURG	KIDNEY TRANSPLANT	4.6267	3.8463	-16.9
303	11	SURG	KIDNEY, URETER & MAJOR BLADDER PROCEDURES FOR NEOPLASM	2.7606	2.7747	0.5
304	11	SURG	KIDNEY, URETER & MAJOR BLADDER PROC FOR NON-NEOPL WITH CC	2.0322	2.3651	16.4
305	11	SURG	KIDNEY, URETER & MAJOR BLADDER PROC FOR NON-NEOPL W/O CC	1.4893	1.3665	-8.2
306	11	SURG	PROSTATECTOMY WITH CC	1.2593	1.4376	14.2
307	11	SURG	PROSTATECTOMY W/O CC	0.9585	0.9121	-4.8
308	11	SURG	MINOR BLADDER PROCEDURES WITH CC	1.1487	1.5354	33.7
309	11	SURG	MINOR BLADDER PROCEDURES W/O CC	0.8644	0.8620	-0.3
310	11	SURG	TRANSURETHRAL PROCEDURES WITH CC	0.7265	0.9026	24.2
311	11	SURG	TRANSURETHRAL PROCEDURES W/O CC	0.5564	0.5681	2.1
312	11	SURG	URETHRAL PROCEDURES, AGE >17 WITH CC	0.7307	0.8246	12.9
313	11	SURG	URETHRAL PROCEDURES, AGE >17 W/O CC	0.5804	0.5286	-8.9
314	11	SURG	URETHRAL PROCEDURES, AGE 0-17	0.4323	0.4323	0.0
315	11	SURG	OTHER KIDNEY & URINARY TRACT O.R. PROCEDURES	2.7736	2.3635	-14.8

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
316	11	MED	RENAL FAILURE	1.3210	1.2840	-2.8
317	11	MED	ADMIT FOR RENAL DIALYSIS	0.4907	0.3542	-27.8
318	11	MED	KIDNEY & URINARY TRACT NEOPLASMS WITH CC	0.9216	1.0441	13.3
319	11	MED	KIDNEY & URINARY TRACT NEOPLASMS W/O CC	0.7415	0.5777	-22.1
320	11	MED	KIDNEY & URINARY TRACT INFECTIONS AGE >17 WITH CC	0.8626	1.0230	18.6
321	11	MED	KIDNEY & URINARY TRACT INFECTIONS AGE >17 W/O CC	0.6750	0.7316	8.4
322	11	MED	KIDNEY & URINARY TRACT INFECTIONS AGE 0-17	0.6996	0.6829	-2.4
323	11	MED	URINARY STONES WITH CC &/OR ESW LITHOTRIPSY	0.5862	0.7020	19.8
324	11	MED	URINARY STONE W/O CC	0.4096	0.5139	25.5
325	11	MED	KIDNEY & URINARY TRACT SIGNS & SYMPTOMS AGE >17 WITH CC	0.6503	0.6789	4.4
326	11	MED	KIDNEY & URINARY TRACT SIGNS & SYMPTOMS AGE >17 W/O CC	0.5156	0.4553	-11.7
327	11	MED	KIDNEY & URINARY TRACT SIGNS & SYMPTOMS AGE 0-17	0.5511	0.5511	0.0
328	11	MED	URETHRAL STRICTURE AGE >17 WITH CC	0.5939	0.6266	5.5
329	11	MED	URETHRAL STRICTURE AGE >17 W/O CC	0.4870	0.4431	-9.0
330	11	MED	URETHRAL STRICUTURE AGE 0-17	0.2788	0.2788	0.0
331	11	MED	OTHER KIDNEY & URINARY TRACT DIAGNOSES AGE >17 WITH CC	0.8329	0.9050	8.7
332	11	MED	OTHER KIDNEY & URINARY TRACT DIAGNOSES AGE >17 W/O CC	0.6725	0.5913	-12.1
333	11	MED	OTHER KIDNEY & URINARY TRACT DIAGNOSES AGE 0-17	0.7912	0.6887	-13.0
334	12	SURG	MAJOR MALE PELVIC PROCEDURES WITH CC	1.8035	1.9237	6.7
335	12	SURG	MAJOR MALE PELVIC PROCEDURES W/O CC	1.4643	1.4080	-3.8
336	12	SURG	TRANSURETHRAL PROSTATECTOMY WITH CC	0.9869	1.0774	9.2
337	12	SURG	TRANSURETHRAL PROSTATECTOMY W/O CC	0.7788	0.7505	-3.6
338	12	SURG	TESTES PROCEDURES FOR MALIGNANCY	0.8907	0.7865	-11.7
339	12	SURG	TESTES PROCEDURES FOR NON-MALIGNANCY AGE >17	0.5766	0.5930	2.8
340	12	SURG	TESTES PROCEDURES FOR NON-MALIGNANCY AGE 0-17	0.4335	0.4335	0.0
341	12	SURG	PENIS PROCEDURES	0.9970	1.0294	3.2
342	12	SURG	CIRCUMCISION AGE >17	0.4265	0.4494	5.4
343	12	SURG	CIRCUMCISION AGE 0-17	0.3788	0.3788	0.0
344	12	SURG	OTHER MALE REPRODUCTIVE SYSTEM O.R. PROCEDURES FOR MALIGNANCY	1.1214	1.1302	0.8
345	12	SURG	OTHER MALE REPRODUCTIVE SYSTEM O.R. PROC EXCEPT FOR MALIGNANCY	0.8173	0.8284	1.4
346	12	MED	MALIGNANCY, MALE REPRODUCTIVE SYSTEM, WITH CC	0.8568	0.9360	9.2
347	12	MED	MALIGNANCY, MALE REPRODUCTIVE SYSTEM, W/O CC	0.6441	0.5091	-21.0
348	12	MED	BENIGN PROSTATIC HYPERTROPHY WITH CC	0.6257	0.6588	5.3
349	12	MED	BENIGN PROSTATIC HYPERTROPHY W/O CC	0.4853	0.4059	-16.4
350	12	MED	INFLAMMATION OF THE MALE REPRODUCTIVE SYSTEM	0.6270	0.6734	7.4

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
351	12	MED	STERILIZATION, MALE	0.3333	0.3333	0.0
352	12	MED	OTHER MALE REPRODUCTIVE SYSTEM DIAGNOSES	0.5354	0.4886	-8.7
353	13	SURG	PELVIC EVISCERATION, RADICAL HYSTERECTOMY & RADICAL VULVECTOMY	2.3887	2.2997	-3.7
354	13	SURG	UTERINE, ADNEXA PROC FOR NON-OVARIAN/ADNEXAL MALIG WITH CC	1.3563	1.5482	14.1
355	13	SURG	UTERINE, ADNEXA PROC FOR NON-OVARIAN/ADNEXAL MALIG W/O CC	1.0359	0.9929	-4.2
356	13	SURG	FEMALE REPRODUCTIVE SYSTEM RECONSTRUCTIVE PROCEDURES	0.8470	0.7983	-5.7
357	13	SURG	UTERINE & ADNEXA PROC FOR OVARIAN OR ADNEXAL MALIG	2.1103	2.1591	2.3
358	13	SURG	UTERINE & ADNEXA PROC FOR NON-MALIGNANCY WITH CC	1.1152	1.2941	16.0
359	13	SURG	UTERINE & ADNEXA PROC FOR NON-MALIGNANCY W/O CC	0.9462	0.9025	-4.6
360	13	SURG	VAGINA, CERVIX & VULVA PROCEDURES	0.6338	0.6957	9.8
361	13	SURG	LAPAROSCOPY & INCISIONAL TUBAL INTERRUPTION	0.6594	0.6442	-2.3
362	13	SURG	ENDOSCOPIC TUBAL INTERRUPTION	0.3510	0.4095	16.7
363	13	SURG	D&C, CONIZATION & RADIO-IMPLANT FOR MALIGNANCY	0.6156	0.6597	7.2
364	13	SURG	D&C, CONIZATION EXCEPT FOR MALIGNANCY	0.3921	0.4262	8.7
365	13	SURG	OTHER FEMALE REPRODUCTIVE SYSTEM O.R. PROCEDURES	1.9085	1.9060	-0.1
366	13	MED	MALIGNANCY, FEMALE REPRODUCTIVE SYSTEM WITH CC	0.8624	1.0916	26.6
367	13	MED	MALIGNANCY, FEMALE REPRODUCTIVE SYSTEM W/O CC	0.5353	0.5481	2.4
368	13	MED	INFECTIONS, FEMALE REPRODUCTIVE SYSTEM	0.7610	0.8308	9.2
369	13	MED	MENSTRUAL & OTHER FEMALE REPRODUCTIVE SYSTEM DISORDERS	0.5496	0.4920	-10.5
370	14	SURG	CESAREAN SECTION WITH CC	1.1063	1.0303	-6.9
371	14	SURG	CESAREAN SECTION W/O CC	0.7669	0.7164	-6.6
372	14	MED	VAGINAL DELIVERY W COMPLICATING DIAGNOSES	0.5942	0.4927	-17.1
373	14	MED	VAGINAL DELIVERY W/O COMPLICATING DIAGNOSES	0.3538	0.3212	-9.2
374	14	SURG	VAGINAL DELIVERY W STERILIZATION &/OR D&C	0.5754	0.5641	-2.0
375	14	SURG	VAGINAL DELIVERY W O.R. PROC EXCEPT STERIL &/OR D&C	0.6817	0.6817	0.0
376	14	MED	POSTPARTUM & POST ABORTION DIAGNOSES W/O O.R. PROCEDURE	0.4539	0.3520	-22.4
377	14	SURG	POSTPARTUM & POST ABORTION DIAGNOSES WITH O.R. PROCEDURE	0.7698	0.9882	28.4
378	14	MED	ECTOPIC PREGNANCY	0.7357	0.7787	5.8
379	14	MED	THREATENED ABORTION	0.2409	0.2843	18.0
380	14	MED	ABORTION W/O D&C	0.3792	0.3124	-17.6
381	14	MED	ABORTION WITH D&C, ASPIRATION CURETTAGE OR HYSTEROTOMY	0.3725	0.3694	-0.8
382	14	MED	FALSE LABOR	0.1136	0.1309	15.2
383	14	MED	OTHER ANTEPARTUM DIAGNOSES WITH MEDICAL COMPLICATIONS	0.4452	0.3964	-11.0
384	14	MED	OTHER ANTEPARTUM DIAGNOSES W/O MEDICAL COMPLICATIONS	0.4586	0.3512	-23.4
385	15		NEONATES, DIED OR TRANSFERRED TO ANOTHER ACUTE CARE FACILITY	0.6811	1.2232	79.6

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
386	15		EXTREME IMMATURITY OR RESPIRATORY DISTRESS SYNDROME, NEONATE	3.6480	3.6480	0.0
387	15		PREMATURITY WITH MAJOR PROBLEMS	1.8267	1.8267	0.0
388	15		PREMATURITY W/O MAJOR PROBLEMS	1.1571	1.1571	0.0
389	15		FULL TERM NEONATE WITH MAJOR PROBLEMS	0.5425	1.4127	160.4
390	15		NEONATE WITH OTHER SIGNIFICANT PROBLEMS	0.3486	0.9416	170.1
391	15		NORMAL NEWBORN	0.2218	0.2218	0.0
392	16	SURG	SPLENECTOMY AGE >17	3.2488	3.5252	8.5
393	16	SURG	SPLENECTOMY AGE 0-17	1.5206	1.5206	0.0
394	16	SURG	OTHER O.R. PROCEDURES OF THE BLOOD AND BLOOD FORMING ORGANS	1.0889	1.2250	12.5
395	16	MED	RED BLOOD CELL DISORDERS AGE >17	0.7153	0.7264	1.6
396	16	MED	RED BLOOD CELL DISORDERS AGE 0-17	0.2952	0.3441	16.6
397	16	MED	COAGULATION DISORDERS	0.9969	1.0145	1.8
398	16	MED	RETICULDENDOTHELIAL & IMMUNITY DISORDERS WITH CC	0.9752	1.2115	24.2
399	16	MED	RETICULDENDOTHELIAL & IMMUNITY DISORDERS W/O CC	0.7247	0.6830	-5.8
400	17	SURG	LYMPHOMA & LEUKEMIA WITH MAJOR O.R. PROCUDURE	3.1139	2.6900	-13.6
401	17	SURG	LYMPHOMA & NON-ACUTE LEUKEMIA WITH OTHER O.R. PROC WITH CC	1.9327	2.0871	8.0
402	17	SURG	LYMPHOMA & NON-ACUTE LEUKEMIA WITH OTHER O.R. PROC W/O CC	1.0514	0.9252	-12.0
403	17	MED	LYMPHOMA & NON-ACUTE LEUKEMIA WITH CC	1.3493	1.5222	12.8
404	17	MED	LYMPHOMA & NON-ACUTE LEUKEMIA W/O CC	0.9101	0.8085	-11.2
405	17	MED	ACUTE LEUKEMIA W/O MAJOR O.R. PROCEDURE AGE 0-17	1.0407	1.0407	0.0
406	17	SURG	MYELOPROLIF DISORD OR POORLY DIFF NEOPL W MAJ O.R. PROC WITH CC	2.5302	2.7146	7.3
407	17	SURG	MYELOPROLIF DISORD OR POORLY DIFF NEOPL W MAJ O.R. PROC W/O CC	1.7124	1.4499	-15.3
408	17	SURG	MYELOPROLIF DISORD OR POORLY DIFF NEOPL WITH OTHER O.R. PROC	1.0500	0.8955	-14.7
409	17	MED	RADIOTHERAPY	0.9855	1.0802	9.6
410	17	MED	CHEMOTHERAPY	0.4284	0.4742	10.7
411	17	MED	HISTORY OF MALIGNANCY W/O ENDOSCOPY	0.5907	0.4919	-16.7
412	17	MED	HISTORY OF MALIGNANCY WITH ENDOSCOPY	0.3388	0.3954	16.7
413	17	MED	OTHER MYELOPROLIF DIS OR POORLY DIFF NEOPL DIAG WITH CC	1.0455	1.2385	18.5
414	17	MED	OTHER MYELOPROLIF DIS OR POORLY DIFF NEOPL DIAG W/O CC	0.8983	0.8128	-9.5
415	18	SURG	O.R. PROCEDURE FOR INFECTIOUS & PARASITIC DISEASES	3.3287	3.5067	5.3
416	18	MED	SEPTECEMIA AGE >17	1.6182	1.5894	-1.8
417	18	MED	SEPTECEMIA AGE 0-17	1.1530	0.9346	-18.9
418	18	MED	POSTOPERATIVE & POST-TRAUMATIC INFECTIONS	1.0022	0.9743	-2.8
419	18	MED	FEVER OF UNKNOWN ORIGIN AGE >17 WITH CC	0.9305	0.9778	5.1
420	18	MED	FEVER OF UNKNOWN ORIGIN AGE >17 W/O CC	0.8316	0.6949	-16.4

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
421	18	MED	VIRAL ILLNESS AGE >17	0.5672	0.6255	10.3
422	18	MED	VIRAL ILLNESS & FEVER OF UNKNOWN ORIGIN AGE 0-17	0.6583	0.6274	-4.7
423	18	MED	OTHER INFECTIOUS & PARASITIC DISEASES DIAGNOSES	1.3205	1.5333	16.1
424	19	SURG	O.R. PROCEDURE WITH PRINCIPAL DIAGNOSES OF MENTAL ILLNESS	2.2113	2.2176	0.3
425	19	MED	ACUTE ADJUST REACT & DISTURBANCES OF PSYCHOSOCIAL DYSFUNCTION	0.6090	0.6004	-1.4
426	19	MED	DEPRESSIVE NEUROSES	0.8332	0.6580	-21.0
427	19	MED	NEUROSES EXCEPT DEPRESSIVE	0.7018	0.6315	-10.0
428	19	MED	DISORDERS OF PERSONALITY & IMPULSE CONTROL	0.8513	0.7305	-14.2
429	19	MED	ORGANIC DISTURBANCES & MENTAL RETARDATION	0.8419	0.8868	5.3
430	19	MED	PSYCHOSES	1.0760	0.9329	-13.3
431	19	MED	CHILDHOOD MENTAL DISORDERS	0.6493	0.7134	9.9
432	19	MED	OTHER MENTAL DISORDER DIAGNOSES	0.6968	0.7097	1.9
433	20		ALCOHOL/DRUG ABUSE OR DEPENDENCE, LEFT AMA	0.3906	0.4232	8.3
434	20		ALC/DRUG ABUSE OR DEPENDENCE, DETOX OR OTHER SYMPT TRT WITH CC	0.7096	0.8149	14.8
435	20		ALC/DRUG ABUSE OR DEPENDENCE, DETOX OR OTHER SYMPT TRT W/O CC	0.7978	0.5903	-26.0
436	20		ALC/DRUG DEPENDENCE WITH REHABILITATION THERAPY	1.0166	0.9788	-3.7
437	20		ALC/DRUG DEPENDENCE, COMBINED REHAB & DETOX THERAPY	1.3273	1.3306	0.2
438	20		NO LONGER VALID	0.0000	0.0000	NA
439	21	SURG	SKIN GRAFTS FOR INJURIES	1.6505	1.7523	6.2
440	21	SURG	WOUND DEBRIDEMENTS FOR INJURIES	2.0421	2.2498	10.2
441	21	SURG	HAND PROCEDURES FOR INJURIES	0.7303	0.7185	-1.6
442	21	SURG	OTHER O.R. PROCEDURES FOR INJURIES WITH CC	1.8143	1.9218	5.9
443	21	SURG	OTHER O.R. PROCEDURES FOR INJURIES W/O CC	1.4841	1.2169	-18.0
444	21	MED	MULTIPLE TRAUMA AGE >17 WITH CC	0.7072	0.8207	16.0
445	21	MED	MULTIPLE TRAUMA AGE >17 W/O CC	0.6014	0.5183	-13.8
446	21	MED	MULTIPLE TRAUMA AGE 0-17	0.4796	0.4796	0.0
447	21	MED	ALLERGIC REACTIONS AGE >17	0.4470	0.4703	5.2
448	21	MED	ALLERGIC REACTIONS AGE 0-17	0.3470	0.3470	0.0
449	21	MED	POISONING & TOXIC EFFECTS OF DRUGS AGE >17 WITH CC	0.6951	0.7922	14.0
450	21	MED	POISONING & TOXIC EFFECTS OF DRUGS AGE >17 W/O CC	0.5422	0.4917	-9.3
451	21	MED	POISONING & TOXIC EFFECTS OF DRUGS AGE 0-17	0.5497	0.5907	7.5
452	21	MED	COMPLICATIONS OF TREATMENT WITH CC	0.8079	0.8976	11.1
453	21	MED	COMPLICATIONS OF TREATMENT W/O CC	0.7468	0.5137	-31.2
454	21	MED	OTHER INJURY, POISONING & TOXIC EFF DIAG WITH CC	0.8099	0.9067	12.0
455	21	MED	OTHER INJURY, POISONING & TOXIC EFF DIAG W/O CC	0.6002	0.4692	-21.8

Appendix E. Change in DRG Weights From Fiscal Year 1987 to Fiscal Year 1988.

DRG	MDC	TYPE	TITLE	FY87 WEIGHT	FY88 WEIGHT	PERCENT CHANGE
456	22		BURNS, TRANSFERRED TO ANOTHER ACUTE CARE FACILITY	1.8155	1.9811	9.1
457	22	MED	EXTENSIVE BURNS W/O O.R. PROCEDURE	3.2280	2.5317	-21.6
458	22	SURG	NON-EXTENSIVE BURNS WITH SKIN GRAFT	3.9450	3.7113	-5.9
459	22	SURG	NON-EXTENSIVE BURNS WITH WOUND DEBRIDEMENT OR OTHER O.R. PROC	3.2658	1.7964	-45.0
460	22	MED	NON-EXTENSIVE BURNS W/O O.R. PROCEDURE	1.1592	1.0495	-9.5
461	23	SURG	O.R. PROC WITH DIAGNOSES OF OTHER CONTACT WITH HEALTH SERVICES	1.3548	0.7198	-46.9
462	23	MED	REHABILITATION	2.1404	1.7517	-18.2
463	23	MED	SIGNS & SYMPTOMS WITH CC	0.7949	0.7633	-4.0
464	23	MED	SIGNS & SYMPTOMS W/O CC	0.6952	0.4740	-31.8
465	23	MED	AFTERCARE WITH HISTORY OF MALIGNANCY AS SECONDARY DIAGNOSIS	0.2881	0.3172	10.1
466	23	MED	AFTERCARE W/O HISTORY OF MALIGNANCY AS SECONDARY DIAGNOSIS	0.4152	0.5383	29.6
467	23	MED	OTHER FACTORS INFLUENCING HEALTH STATUS	0.7212	0.4723	-34.5
468			UNRELATED OPERATING ROOM PROCEDURES	2.4516	2.4679	0.7
469			PRINCIPAL DIAGNOSIS INVALID AS DISCHARGE DIAGNOSIS	0.0000	0.0000	NA
470			UNGROUPABLE	0.0000	0.0000	NA
471	8	SURG	BILATERAL OR MULTIPLE MAJOR JOINT PROCS OF LOWER EXTREMITY	3.6991	4.0896	10.6
472	22	SURG	EXTENSIVE BURNS WITH O.R. PROCEDURE	12.3234	10.7296	-12.9
473	17	MED	ACUTE LEUKEMIA W/O MAJOR O.R. PROCEDURE AGE >17	2.3275	2.7107	16.5
474	4		TRACHEOSTOMY	NA	11.8772	NA
475	4	MED	MECHANICAL VENTILATION THROUGH ENDOTRACHIAL INTUBATION	NA	3.1757	NA

PROSPECTIVE PAYMENT ASSESSMENT COMM
300 7TH STREET, S.W., SUITE 301B, WASHINGTON